ELECTRIC RAILWAY JOURNAL

Volume 44, Number 9 McGraw Publishing Co., Inc. August 29, 1914

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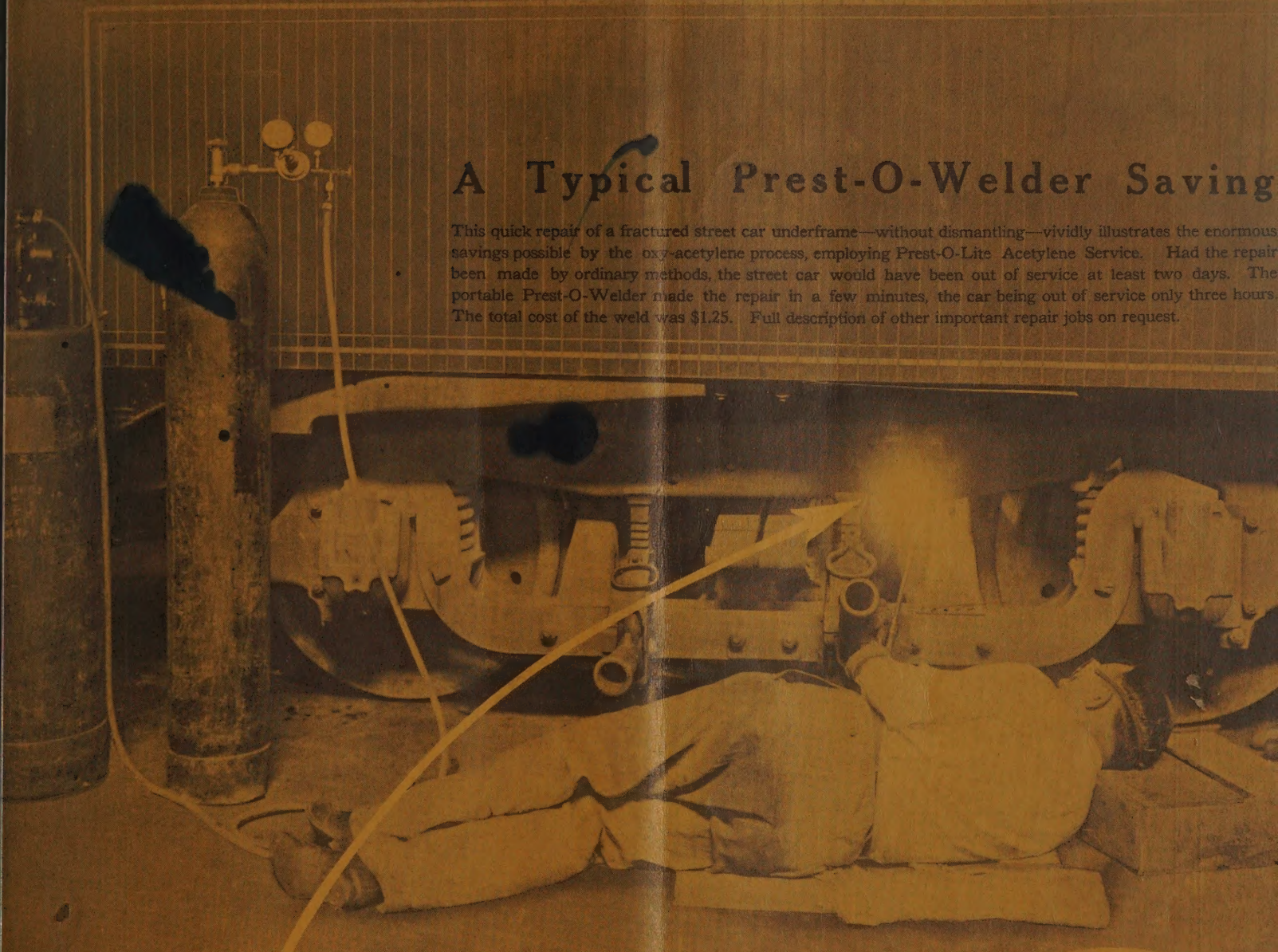

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Electric Railway Journal

New York, August 29, 1914

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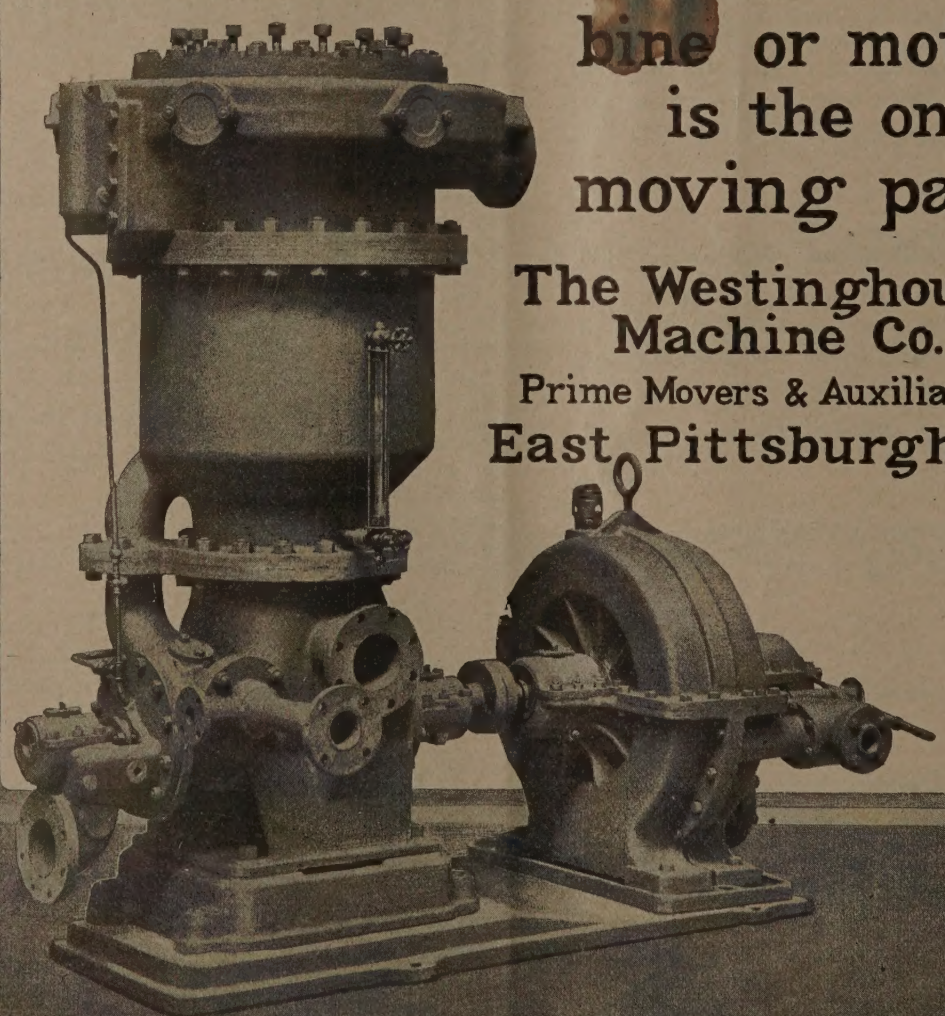

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Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLIV NEW YORK, SATURDAY, AUGUST 29, 1914 No. 9

WHAT DID IT COST?

Last week we published a brief note regarding an attempt of the auditor of an electric road in Maryland to impress upon employees of the company the value of the small supplies which they handle in every-day work. Instead of the usual financial valuation he ingeniously used other units selected to bring the matter closer home. The notion that a lantern is the equivalent to the transportation of a passenger 37½ miles involves a stimulating transformation of ideas. It is extremely difficult for one individual to feel a sense of responsibility for the property of another, even if the other is his own employer, but this is more from thoughtlessness than intent. There is hope of economy, therefore, in every device designed to call attention to the facts. While this is true in regard to material things, it is even more so in connection with the use of time. An employee who would not deliberately throw new fuse plugs at the frogs in the pond near the car-house might unwittingly waste an equivalent value in time in "visiting" or "soldiering." He would not do this if he could "see" the time in the form of a tangible equivalent.

FUTILITY OF HEAVY SIDE SHEATHING

The communication by C. J. McPherson, published elsewhere in this issue, is a most valuable contribution to the many and varied arguments which seem, unfortunately, to be necessary in the process of evolution through which electric railway cars are now passing and during which it is to be hoped that the old-style, house-on-a-flat-car design will be replaced by the all-steel, side-truss type of construction. The basis upon which our contributor's conclusions rest is original but simple, an analysis having been made of stresses and weights (which need only to be considered comparatively) involved by a single standard type of car-side framing which is variously assumed to be constructed with and without sheathing and with and without a top plate. The results, as submitted, indicate forcibly that heavy side sheathing has only a questionable supporting value. With the introduction of a top plate, or where the whole side of the car is designed to act as a truss, the author shows the use of side sheathing to be quite as unnecessary as are facts in a war bulletin. The sheathing may be actually removed complete without an appreciable loss in strength. With the side-girder type of design, where the strains from the load extend only between the belt rail and sill, he shows that when the side sheet is removed there is an addition of only 38 per cent to the stress as against a reduction of 22 per cent in the beam weight. Following out Mr. McPherson's idea it may be calculated that if the strength is maintained by adding metal to the belt rail and sill, and if 1/16-in. sheathing is used as a gusset plate only, the beam weight will actually be reduced some 2 lb. per running foot. This illuminating exposition is something for designers to think over seriously.

SAVING UNDER GOVERNMENT OWNERSHIP

Considerable attention has been directed toward articles recently published by the *Saturday Evening Post* on the subject of government ownership of steam railroads. Drawing from a wide source of anti-railroad publicists, ex-Governor Stubbs of Kentucky started the program by producing a scarecrow that was calculated to frighten the most ardent believer in the private operation of public utilities. In a subsequent article, however, Edward P. Ripley, president of the Atchison, Topeka & Santa Fé Railway, easily disposed of most of the statements made by Mr. Stubbs. Since contributing this general refutation, Mr. Ripley has taken up more in detail the question of the savings that would result from government ownership of railways on account of the use of government credit. Being in doubt as to the accuracy of a statement by Clifford Thorne that the government would save $400,000,000 by financing the railroads on a 3 per cent basis, Mr. Ripley wrote to Sir George Paish, editor of the London *Statist*, who is well known all over the world as an authority on financial matters. In reply this expert stated that one could not possibly calculate a greater profit from immediate ownership than about $60,000,000 per annum on the common stock. Moreover, there could be no immediate saving of interest from government purchase as regards the funded debt, although a barely possible refunding at the maturity of the existing bonds might save $70,000,000 per annum. That such a saving as this is incomparably small when placed against the inevitable extravagance, waste and loss which results from government ownership, is a fact upon which we do not need here to dwell. The chief point to be noticed is the difference between the computations of amateur railway economists and those of a man thoroughly understanding railway finance. American newspapers have in recent years been surfeited with figures and articles written by government ownership advocates with a maximum of assurance and a minimum of information. A few pertinent facts from the real authorities in the field are often sufficient to overthrow the innumerable statements bandied about by such writers.

THE HYBRID STEEL-UNDERFRAME CAR

A recent statement on steel passenger cars in service on the steam railroads of the United States includes figures to show that, at the present time, there are in use approximately half as many cars with steel underframes as there are of all-steel construction. The steel-underframe cars are classed, by indirection, as steel cars, although wherein this assumption is warranted is by no means clear. Certainly the steel underframe, as a step in the evolution of the all-steel car, has served its purpose in full by this time, and it is obvious that it should diminish in comparative numbers on both the steam and electric railways at a rapidly accelerating rate.

This belief is supported by the figures given for past years by the steam railroads. In 1908 the all-steel passenger cars in service constituted 48 per cent of the combined number of steel and steel-underframe cars. In 1913 the number of all-steel cars had increased enough to change the ratio to 68 per cent and 32 per cent. On the basis of annual production the all-steel cars constructed during the year 1909 numbered 53.5 per cent, the steel-underframe cars constituting 46.5 per cent. For the year 1912 the corresponding figures were approximately 77 per cent and 23 per cent. The estimated figures for 1914 are 87 per cent for all-steel and 13 per cent for steel underframes, even though the latter figure includes the old wooden cars that were reconstructed with steel sills. Unfortunately, similar statistics are not available for the electric railway industry, but judging in general by the reports of the newly built cars the steel underframe is losing much less ground on electric railways than it is on the steam lines.

By steel underframe is meant, of course, a construction wherein no steel extends above the floor line. The so-called "side-girder design," now generally termed semi-steel, in which the side sheathing is made of steel plate that extends as high as the window sills is not, therefore, included, the obvious reason being that it escapes the inherently defective principle of carrying load on shallow beams which is involved by the true steel-underframe construction. This limitation of depth of beam is, of course, the most serious handicap that can be imposed upon any structure that carries weight, and it is no credit to the electric railway industry that the deleterious influence of this class of car design is not being grasped more promptly than is indicated by recent records.

That, of all the steps in the evolution from wood to steel as a material for car construction, the steel-underframe design for street railway cars should remain, even in its present moribund condition, is an absurdity. Foregoing all of the advantages of the girder or truss design that the use of steel makes possible, it retains only the feature of greater collision strength over wood, and in city service this advantage is worth just about as much as an umbrella for a school of fish. On the other hand, the steel underframe perpetuates the necessity for car repairmen working with steel, this being the most frequently quoted objection to the all-steel car, which may be purely psychological but is none the less difficult to overcome. At best, it is a hybrid construction with which the electric railways can well afford to dispense.

THE COMPETITION OF THE AUTOMOBILE

Our English tramway brethren have long been concerned at the inroads of the motor bus. American electric railway operators have not had to contend with this self-propelled vehicle but in many cities have had to face the competition of the private automobile. We realize that this competition is usually considered slight. But we do not know of any city except Denver where a serious attempt has been made to learn its actual extent. Of course, if only the owner rode to business the influence of the automobile on the trolley receipts would be small. But in a city of moderate size where the owner in a spirit of generosity and hospitality invites his next-door neighbor to take a seat in his car and extends this invitation as well to his other friends until the car is full, the total effect of a large number of cars is considerable. This truth is brought out with startling clearness by the traffic figures presented in this issue by Roger W. Toll, chief engineer Denver Tramways. The investigation conducted under Mr. Toll's supervision showed that on a typical weekday, passenger automobiles alone carried 8.2 per cent of all the traffic going by certain points in the business district. Furthermore, motorcycles and bicycles carried 6.4 per cent, horse-drawn vehicles, 1.3 per cent, and pedestrians constituted 29.2 per cent. This leaves 54.9 per cent to the street railway.

This figure is a lower proportion of the total travel than one would expect in most cities of greater size or even in those of equal size. In the large Eastern cities, for example, the bicycle and motorcycle are practically unknown for business uses; furthermore, in large cities the distance from the residential to the business district is too great for walking by so large a percentage as that found in Denver. But even if the influence of the passenger automobile alone is considered, Mr. Toll finds that its business in possible 5-cent fares is equivalent to $437,372.20 a year —a very tidy sum to add to the gross earnings of any company.

It is likely that prosperous Denver, with its wide, level streets and non-congested residential districts, has more than the usual number of automobiles. Still the time is not far away when many other cities may have the same or an even greater percentage of automobile traffic. When machines can be bought for only $440 each, the only factors that seem capable of impeding their extension to a point that would seriously impair street railway earnings are garage rentals, street spacing for safe travel and the rising price of fuel.

The inroads of the automobile are really more serious to the interurban electric railway than to the city railway. Much interurban travel is half business and half social, because so many people com-

bine shopping and pleasure when they go, say once a week, from the country to the local metropolis. Many trips of this character are now made by automobile, with two or three neighbors as guests. Farmers who raise garden truck are also tempted to use the automobile when it can be used to convey their produce as well as themselves. From this angle it is clear that the interurbans can be hurt appreciably if they do not make it clear to prospective patrons that the cost of automobile trips is greater, while the speed, safety and convenience of such machines are less, than with the modern interurban car.

IMPENDING COMMERCIAL WARFARE

The present colossal struggle in Europe has naturally dislocated every phase of commercial life in the warring countries, but America cannot afford to accept the present situation with simply a vociferous welcome of increased commercial activities heretofore restricted by foreign competition. To be sure, the people of the United States as a whole have no desire to make capital out of the misfortunes of other peoples, but there may be a few effervescent spirits who will do well to look upon the present commercial opportunity as a chance for performing a real world service instead of merely conquering foreign markets.

At present the German overseas trade is virtually obliterated; the home of Belgian manufacturers is bathed in blood; English electric railway exports are comparatively small—all of which conditions make an unprecedented opening for us in the trade of South America and the Far East. Appreciation of the European catastrophe that has made this possible can be shown only through taking advantage of the present opportunity without unseemly precipitation and through endeavoring to afford South American countries as good, if not better, service than they have formerly received from our competitors.

To attain the above result, we must realize fully the difficulties confronting us, as pointed out in interviews with W. J. Clark and G. H. Charls, published elsewhere in this issue. It must be remembered that the cessation of European exports also means the cutting off of the great European customers for South American imports, and that the resulting South American trade restriction must be helped by our bankers and capitalists. South American sales requirements and conditions must also be studied and exactly met. Furthermore, it may be wise to note that English electrical manufacturers are hailing the opportunity for securing German trade in South America, and that some competition from this source will persist even in the face of danger. If these problems are properly solved by our manufacturers, there will come a boom to this country that will probably be permanent, but at the same time our friendly relations as a nation with all the European countries will be conserved. The ultimate result will probably be a more even division in the world's trade than has heretofore existed.

PERMANENT TRACK A FALLACY

Several articles and communications in recent issues of this paper have drawn attention to the lack of appreciation on the part of some companies of the importance of first-class maintenance of track. It appears that many street railway managers take the term "permanent track construction" literally and, failing to take the "stitch in time," find that the term is not only a fallacy but that the so-called permanent type of track construction lasts but little longer than its predecessor. If managers and engineers expect to profit by the increased life obtainable from the permanent types of track construction they must give constant attention to its maintenance.

Probably before any other defects which develop under traffic are in evidence, inequalities and inaccuracies in track construction will show themselves. After these have been corrected, the points subject to severest wear under traffic present themselves. Usually these occur in track special work or at the joints. In either case they generally take the form of cupping, and grinding or welding should immediately be prescribed. If this is done promptly, the defect will not be reflected in the substructure where the cost of repair is many times that of merely removing the cups on the surface at the proper time. Following the cupping at joints, many complications arise which ultimately destroy the entire structure, making a complete renewal necessary. In other words, the price of neglectful maintenance is high cost of operation. This is reflected not only in the future maintenance of the tracks but in the maintenance and in practically every phase of car operation.

No track structure is permanent, and it is foolish for anyone to consider that its maintenance may be forgotten even for the shortest period of time. The secret of true economy in the subject we are considering is unceasing vigilance followed by prompt repairs. When this vigilance is present but is accompanied by inefficient repair methods, or the repairs are made by incompetent men, the life of the structure is increased but the maximum is not obtained. The track is an engineering structure, and engineering intelligence must be put into it. As a rule the work of maintenance in the power station and in the repair shops is so concentrated that the engineer or master mechanic in charge can personally supervise the more difficult repairs. With the track department the case is entirely different—the work covers a wide area and much of the supervision must be left to the section foreman, who in most instances is nothing more than a first-class laborer.

If the same amount of intelligence and money was expended in maintaining a track structure in proportion to its cost as is expended in maintaining rolling stock and power station equipment, we firmly believe that the cost of track maintenance would be much lower than it is to-day, and undoubtedly the life of the structure would be greatly increased. Simply because a failure in either the power station or cars stops income is no economic reason for slighting the most expensive portion of the composite structure.

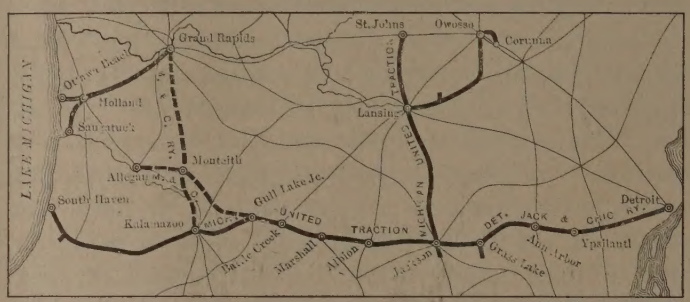
Third-Rail 2400-Volt Construction on the New Michigan & Chicago Railway

This High-Speed Line Connecting Kalamazoo and Grand Rapids Will Be the First Electric Railway in the World to Use a 2400-Volt Third-Rail—The Line Will Be Placed in Operation Next Autumn

Another long stride in the advance of direct-current voltages for third-rail operation will be taken when the new Michigan & Chicago Railway's 2400-volt line is completed. When ready for operation this line will include 91 miles of single track in southern Michigan, connecting Kalamazoo and Grand Rapids, and also Allegan and Battle Creek. That portion of the line between Kalamazoo and Grand Rapids, 49 miles in length, is being newly constructed throughout. The line between Allegan and Battle Creek, 42 miles long, is an old steam road purchased from the Michigan Central Railroad and it is now being electrified for 2400-volt, third-rail operation.

Standards adopted for the construction of this new line provide for high speed with 3 deg. maximum curves and 1 per cent maximum grades. All track, including main line and sidings, is being laid with 80-lb. A. S. C. E. rail on 6-in. x 8-in. x 8-ft. cedar ties, spaced twenty to a 33-ft. rail. Every sixth tie is 10 ft. long, the additional length being provided to furnish support for the third-rail. All sidings are being made double end with No. 12 turnouts having 90-ft. leads, and each siding provides 600 ft. of track in the clear. Both side tracks and main tracks are laid on from 6 to 8 in. of gravel ballast distributed in sufficient quantities to provide a liberal shoulder. Track bonding includes compressed terminal cross-bonds and exposed, Type J, Ohio Brass bonds at all joints.

In order to adhere to the track and roadway standards the grading quantities per mile averaged approximately 20,000 cu. yd., making the total for the new 49-mile line amount to about 1,000,000 yd. The subgrade standards provided for a 100-ft. private right-of-way, and a 16-ft. roadbed in cuts and fills



MICHIGAN & CHICAGO RAILWAY—MAP OF THE SYSTEM

with ample provision for drainage in the former. All waterways under the subgrade are provided with permanent structures. Where reinforced concrete pipe would not supply a sufficiently large opening, reinforced concrete, flat-top arches were constructed. In a few instances the spans were too long for this design and at these points through girders with ballast decks were installed.

MICHIGAN & CHICAGO RAILWAY—VIEW SHOWING THIRD-RAIL AND TRACK CONSTRUCTION

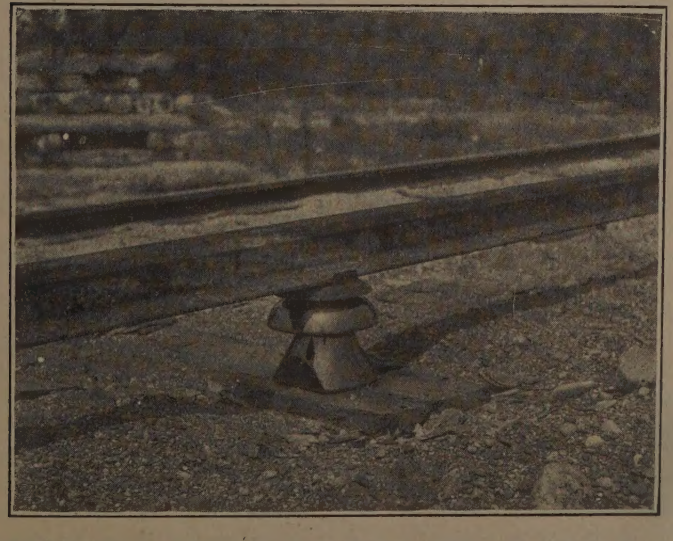
At the present time two bridges are under construction, one over the Kalamazoo River at Kalamazoo, and the other over the Grand River at Grand Rapids. Both of these are important structures, as they provide direct entrance to the north and south terminals of the new line. The bridge at Grand Rapids is a permanent one that rests on concrete piers and abutments. The one at Kalamazoo is a timber trestle with one set of through girders. A temporary structure was provided at the latter point in order to permit a more thorough study of the waterway requirements before a permanent bridge is provided.

2400-Volt, Third-Rail Details

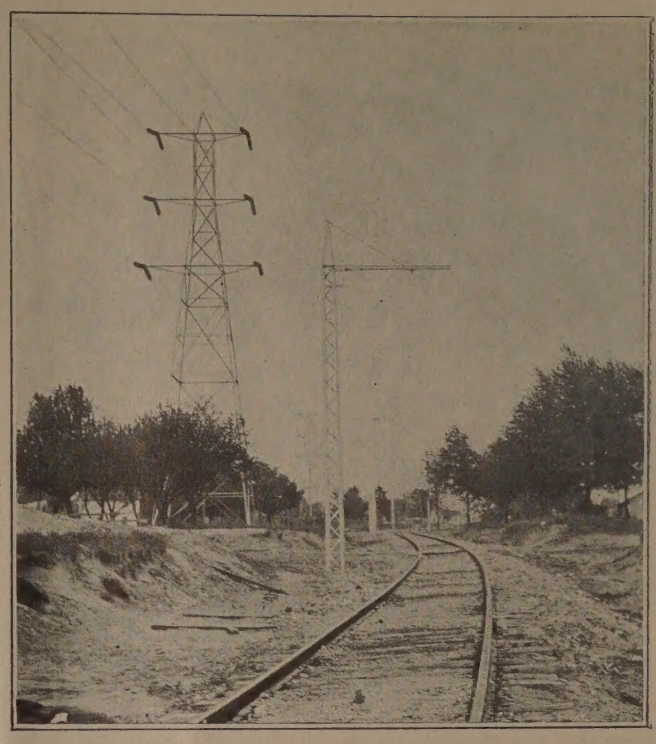
Undoubtedly the most interesting part of the construction of this new line is found in the manner of supporting and insulating the 2400-volt third-rail. Practically all of the third-rail is now in place, and tests are now being conducted to determine the best method of providing an insulated guard for it. As shown in the accompanying illustration the third-rail is installed on special insulators, which are 8½ in. high and are provided with a single petticoat 9½ in. in diameter. After the long ties have been accurately adzed to insure a uniform third-rail surface, a small rectangular casting is fastened to the tie with a lag screw. A pocket in the base of the third-rail insulator fits snugly over this base casting. A similar pocket in the top of the insulator takes a malleable iron saddle casting provided with lugs which exactly span the third-rail base. Both the insulator and the third-rail are held in position by their own weight, and the rail is permitted to move freely in accordance with the effects of expansion and contraction.

Prior to adopting the third-rail clearance a careful study was made of a number of Eastern steam-road electrifications that use third-rails in order to determine what clearance would be ample for all classes of equipment. As a result of this study the third-rail was placed at a horizontal distance of 32 in. from the adjacent track rail and 8½ in. above the track-rail surface. This clearance is believed to be ample for any steam-road equipment on tangent track, but at turnouts it was found necessary to depress the third-rail approximately to the same elevation as that of the track rail to insure clearance as a car passes over the switch points into the lead curve. All third-rails are stub-ended at crossings, and poles are set each side to support an overhead contact wire.

Through the cities and villages where the line leaves the 100-ft. private right-of-way, or where it is



MICHIGAN & CHICAGO RAILWAY—VIEW OF THIRD-RAIL CONSTRUCTION



MICHIGAN & CHICAGO RAILWAY—VIEW SHOWING OVERHEAD TROLLEY CONSTRUCTION THROUGH CITIES

necessary to provide team tracks and station facilities, the propulsion current is carried on overhead trolley wires. At these locations galvanized structural poles with mast-arms are provided. The poles are 35 ft. long and are set with 18 in. of concrete at the bottom of the hole and 18 in. at the top. The sections of overhead trolley which are carried on the mast-arm construction are dead-ended by connecting the trolley ends to a pair of structural-steel galvanized poles, one set each side of the track. A view of this class of construction is shown in one of the illustrations.

As the third-rail clearance was unusually wide the use of a specially designed third-rail shoe was required to provide for operation through public streets. Accordingly, the shoe was arranged to operate with a pneumatic folding mechanism under the control of the motorman. Since practically the entire line is on private right-of-way, even well into the cities of Kalamazoo, Battle Creek and Grand Rapids, these third-rail shoes need be in the folded position only during the short intervals when a car is operating over the streets at these terminals.

Supply of Energy

According to present plans the whole line will be fed from Kalamazoo, Battle Creek and Grand Rapids at 2400 volts d.c., and no additional feeder other than the 80-lb., A. S. C. E., low-carbon third-rail will be employed. In case energy supplied from these three points is insufficient, 42,000-volt and 70,000-volt a.c. transmission lines that are already installed on steel towers along the private right-of-way may be tapped to supply energy to a substation at some intermediate point. This transmission line forms a part of the network of lighting and power lines of the Commonwealth Power & Light Company, owned and operated by the same holding company as the one which owns the new railway line.

Present Status of Work

The work completed up to June 1 includes all the track and roadway except that portion in the immediate vicinity of the cities of Kalamazoo and Grand

Rapids. All third-rail is now installed but is awaiting the selection and installation of the protecting guard. Entrance to Kalamazoo and to Grand Rapids is arranged for, but the work was delayed both by the franchise negotiations and the construction of the two bridges mentioned.

The electrification of the steam road between Allegan and Battle Creek has been started. Third-rail ties are being placed and the overhead construction through the cities and villages is well under way. Three new telephone circuits will be provided on both divisions of the line. One will be used for train dispatching, one for commercial purposes and the third for power dispatching. These lines are being constructed on separate wooden poles. The overhead transmission power line is complete, but will not be put in service until the railway is ready for operation.

When the Michigan & Chicago Railway is completed it will form a part of the Michigan Railway Company's system, which is operated by the officers of the Michigan United Traction Company. This system includes the Michigan United Traction Company that operates a 1200-600-volt d.c. overhead and third-rail line; the Grand Rapids, Holland & Chicago Railway, a 1200-600-volt overhead line; the Saginaw-Flint Railway, a 1200-600-volt overhead and third-rail line, and the new Michigan & Chicago Railway, which will be a 2400-1200-volt third-rail line. In total length this system comprises approximately 470 miles of single track, practically all of which will be operated at 1200 volts on private right-of-way, excepting the Michigan & Chicago Railway, which will start at 1200 volts and later be raised to 2400 volts.

Responsibility for Pavement Repair Along Car Tracks in Chicago

In an article by P. E. Green, consulting engineer of Chicago, printed in the *Engineering Record*, the question of pavement deterioration along street railway tracks in Chicago is discussed. An abstract follows:

One of the most perplexing problems in modern city pavement is the maintenance of a first-class pavement along street railway tracks. In practically all cities this trouble is encountered. The city of Chicago has lately won an exceedingly important case in litigation on this point. The decision means hundreds of thousands of dollars to the city and to various contractors. It will undoubtedly be appealed and hence will not be finally decided for two or three years.

In order that the following discussion may be clear, the "brow pavement" is defined as that part of the paving area within a couple of feet and outside of the street railway tracks. The "quarter point" or "quarter" is the point midway between the outer rail and the curb.

Lincoln Avenue, where this question arose, is one of the principal secondary business streets of the North Side of Chicago. It is a diagonal street and accommodates a heavy traffic, both vehicular and street railway. It is paved with creosoted-wood blocks on a sand bed 1 in. in thickness and a 6-in. concrete foundation. The pavement was constructed in three sections—the first mile in 1907, the second mile in 1908 and the third mile in 1909. The space between the rails and tracks is paved with granite block for the first two miles and with wood block in the third. The creosoted-wood block pavement is laid in rows of approximately 45 deg. to within 4 in. of the rail. Most of the brow has a single longitudinal block laid parallel with the rail. On the west side of the first mile, however, the diagonal rows extend to the edge of the rail.

The railway construction is what is known as "Type 3," as adopted by the Board of Supervising Engineers, Chicago Traction. This type of track consists of a lower course of 8 in. of crushed stone upon which the ties and rails are laid. The ties and bases of the rails are covered and surrounded by 8 in. of concrete. On the top of the concrete is spread the sand bed, and the pavement is laid on this. In the first mile mentioned, in addition to this crushed stone, crushed cobbles were placed in the bottom of the track trench and the whole was thoroughly rolled with an Iroquois 10-ton roller. Particular attention is called to this type of construction, as its ability to stand up under the traffic was a question of the problem discussed in the following paragraphs. The rails themselves were of the 129-lb. Chicago section.

In longitudinal profile the street is exceedingly flat, there being only about 3 ft. difference in elevation in 3 miles. The roadway of Lincoln Avenue is 42 ft. wide from curb to curb. Since the railway right-of-way is 16 ft. wide, the pavement is approximately 13 ft. wide on each side of the railway right-of-way.

Traffic Census

Traffic is heavier in the first mile, especially as regards the railway traffic, than in the second or third mile. This is because Lincoln Avenue is known as a through-route street, and at the end of the first mile some of the cars turn off the avenue. A census of the traffic taken between the hours of 7.30 a. m. and 10 p. m. is given in the table.

Census of Traffic between 7.30 a. m. and 10 p. m.

First mile	Street cars 1041,	Vehicular traffic 1500
Second mile	Street cars 746,	Vehicular traffic 1814
Third mile	Street cars 457,	Vehicular traffic 1010

For the past four or five years the street cars have been practically all of the large pay-as-you-enter type, weighing when loaded about 80,000 lb. Previous to that time cars of all sizes and types were used, with the heaviest weighing about 50,000 lb. loaded.

Extent of Damage

Within the past three years the condition of the brow in the first and second miles, and especially the first mile, has become very bad. The pavement for a distance of from 6 in. to 4 ft. from the rail has been broken down and dips below the tops of the rails. Between the rails the granite blocks have also dropped down to a considerable extent, though not as badly as on the outside. In general appearance it would seem as if the entire right-of-way had been dropped from 1 to 2 in., with the resultant disintegration of the pavement. At intervals humps or blisters were in evidence on the pavement, generally in the vicinity of the gutters. These humps were from 3 to 20 ft. in length and rose above the general surface of the pavement from 2 to 6 in. Adjoining such humps the surface of the pavement was invariably broken down and depressed.

After much correspondence between the proper city authorities and the contractor for the original work in the fall of 1911 and early part of 1912, the contracting company, one of the largest and most responsible in the city of Chicago, and a company which has had an irreproachable reputation, refused to make further repairs. It stated that the railway construction was not strong enough to withstand the heavy cars now in use and that they were not contemplated at the time the pavement was built.

If the pavement had not been repaired at once it would certainly have been destroyed from curb to curb within a few months. An agreement was therefore made between the city and the contractor that the contractor should make the repairs at once and that the

actual cost of the repairs should be deposited in escrow awaiting the final decision of the courts.

Repairs of the pavement were begun immediately, and a thorough investigation of the causes of the trouble was made. Since the concrete was exposed on the outside of the rails for the purpose of making repairs, very accurate measurements were taken at frequent intervals to observe the actual contour of the foundation, and minute investigation was made as to the condition of the concrete immediately adjoining the track—in other words, along the brow. This concrete was almost always found to be in excellent condition as regards the material. It was sound and unbroken except that for about 20 per cent of the longitudinal distance and immediately adjoining the bottom of the rail it had become shattered. The same condition as to concrete was found between rails, though it was noted that only over ties was the concrete usually disturbed.

The testimony of all the witnesses was universally to the effect that the concrete foundation was in excellent condition. The street railway company testified that in very few cases had they found broken concrete. In the spring of 1913 they had repaired the pavement between their rails and had shimmed their track whenever necessary. These shims consisted of iron plates from 1/32 in. to ½ in. thick, but by far the greater number used were of the smaller size, and only in very few cases were the ½-in. shims employed. Where these were used there had been cuts made in the pavement by the public-utility companies.

It was also brought out in the case by testimony of city employees and by the contractor that the concrete when originally laid had been surfaced to three stakes set across the half roadway between the track and the curb, one stake being set at the end of the ties, one at the quarter point and one at the gutter. No allegation was made by the city that the material or the thickness of the foundation was defective in any way. It was very clearly demonstrated, however, that the concrete midway between the brow and the gutter was almost universally from ¼ in. to 1 in. higher than the concrete at the rails. In other words, either the track had gone down or the concrete had not been carefully laid to grade. It had also been clearly shown that the concrete was in excellent condition, that it was not at any time broken or shattered except for a distance of 2 in. or 3 in. adjoining the rail in about 20 per cent of the length of the street.

In the investigation of the foundation, three large openings were made in the pavement entirely through the concrete to the subgrade and the thickness was very carefully measured. These holes, which were taken at distances apart of about 2000 ft. on alternate sides of the street, exposed the contour both of the top and bottom concrete. They showed, first, that the concrete was sound and unbroken; second, that at its thickest point, which was the high point of the surface, the concrete was fully 7 in. thick; third, that the bottom of the concrete foundation was below the theoretical bottom as shown in the original ordinance and plans, while the top was above the theoretical line established as the top of the foundation. Both the theoretical top and bottom were established for these points by assuming the present top of rail elevations to be at original grade.

THEORY OF CAUSE OF TROUBLE

From this investigation it was concluded that the railway tracks did not settle appreciably. After six years' use under heavy traffic the only work necessary to put the track in first-class line and grade was an occasional shim 1/16 in. thick. No decided depressions of the track were found. It is inconceivable that the track could settle uniformly from 1 to 2 in. without breaking the concrete around the ties and back of the rails and without badly distorting both line and grade.

It is undeniable that at present the surface of the concrete midway between the quarter and the brow (half way between stakes as set) is from ¼ in. to 1 in. above the concrete abutting the rails. Yet the concrete is sound and unbroken. When this condition exists any water getting between the blocks and the foundation cannot drain away through the sand bed to the sewer inlets in the gutter. Traffic pounding the blocks and street cars pounding the rails—all act as the plunger of a pump and the sand is forced up through the joints to the surface of the pavement and then blown away. In a short time the blocks of the brow pavement drop, and then the wheeled traffic pushing and pounding on the distorted blocks, tilted toward the rails, gradually forces the sand back toward the curb, forming the large blisters previously described. Some of these blisters when opened showed a depth of 6 in. of sand at their high point.

WHY HIGH FOUNDATIONS?

It may be asked why the concrete foundations should be high between the stakes. It was believed that the concrete spreaders on a street having such a flat profile and section kept the concrete high at the point in question. The cross-section was so flat at this point of the curve and the instructions were that there must not be any depressions in the base. Consequently the men instinctively went to the other extreme and made it slightly higher. During construction it passed unnoticed, for as soon as the concrete set the sand bed was roughly spread on it to protect it from street traffic using the railway right-of-way.

THE REMEDY

The remedy is plain. Drainage must be perfect. If it is, there will be little trouble with any modern brow pavement, provided the street railway has a foundation at all adequate for its purposes. A dip in the foundation toward the rails of ¼ in. to 1 in. in 3 ft. may seem a small thing to many engineers, but if no water is held in the sand bed there will be no hydraulic action caused by the traffic. It is not a question of whether or not a sand cushion or a mortar bed is placed under the blocks. A mortar bed under constant pounding will pulverize and the same action take place. It is the old question of perfect drainage. Water is the great enemy of all street pavements. The more nearly the actual drainage conforms to the theoretical requirements, the more perfect the wearing surface will be and will remain under the heaviest traffic.

Typhoons and Philippine Transmission Lines

From June to October of each year the Philippine Islands are subject to typhoons which occasionally interrupt electric service by blowing débris against transmission lines and poles. These whirlwinds are usually very violent and occur without warning, uprooting trees, demolishing houses, sucking up large quantities of water, and sometimes even swamping ships. Because of their vertical, gyratory movement, however, they are not as destructive to transmission lines as equivalent horizontal gusts or gales of wind would be, except when they drop entrained débris on the lines or trail loose branches of trees through the conductors. The Manila Electric Railroad & Light Company reports that these disturbances do little damage to its trolley wires unless loose branches are flying through the air. Ordinarily the typhoons cause about the same interference with operation as would a fairly bad snow and sleet storm in the States.

Traffic Investigation in Denver

Counts of All Vehicular Traffic Made by Forty-four Men on the Thirty-six Streets Entering the Business District of Denver Showed that 53 Per Cent of All Travelers Used the Street Cars—If Automobilists Used the Car Service the Annual Gross Revenues of the Railway Would Increase Nearly $440,000

BY ROGER W. TOLL, CHIEF ENGINEER DENVER TRAMWAYS

Most traction companies are interested in knowing how the people of their city travel, and what proportion of the travel is carried by the street cars. Thus, the number of passengers carried by automobiles is often conjectured, but usually there are very few data upon which to base an estimate upon this and similar questions. To determine this information in the case of Denver, a traffic investigation was recently conducted under the direction of John A. Beeler, vice-president and general manager of the Denver Tramway Company. The following synopsis of the methods used in making the investigation and the results obtained are presented:

Boundaries of Assumed Business District

The business district, as assumed for the purposes of this investigation, is bounded by the lines shown on the map on the opposite page.

East side of Broadway from Colfax Avenue to Twentieth Avenue.

Northwest side of Welton Street from Twentieth Avenue to Twentieth Street.

Southwest side of Twentieth Street from Welton Street to the Platte River.

Center line of the Platte River from Twentieth Street to Cherry Creek.

Center line of Cherry Creek from the Platte River to West Colfax Avenue.

South side of West Colfax Avenue from Cherry Creek to Broadway.

The area included within this business district is 0.87 sq. mile. The total area of the city and county of Denver is 58.75 sq. miles. The area of the business district, here assumed, is slightly less than 1½ per cent of the area of the entire city. The district includes not only the retail business district but the greater part of the wholesale district and a portion of the railroad yards.

Classification of Traffic and Observations

All street traffic, exclusive of street car passengers, was grouped in accordance with the following classification:

A—Persons in passenger automobiles.
B—Persons in freight automobiles.
C—Persons on motorcycles.
D—Persons on bicycles.
E—Persons in horse-drawn passenger vehicles.
F—Persons in horse-drawn freight vehicles.
G—Pedestrians.

The accompanying blank shows the form used by the observers on this work.

There are thirty-six public thoroughfares entering this business district. At a few locations the travel was so light that one observer recorded the travel on two streets. At five locations the travel was so heavy that two observers were required, one to record pedestrians and the other to record vehicle traffic. The observations were taken by forty-four men, most of whom were trainmen. Half of the men were on duty from 6 a. m. until 3 p. m.; they were then relieved by the other half, who were on duty from 3 p. m. until midnight. The observations were therefore continuous from 6 a. m. until midnight, a period of eighteen hours. The observations covered a period of two days, as the number of available men was insufficient to cover all locations in one day. These days were Monday, May 4, and Tuesday, May 5.

TRAFFIC INVESTIGATION

Date _____ Day of Week _____

Location _____ Weather Conditions _____

Name of Observer _____ Special Conditions _____

TIME		Persons in Passenger Autos, Electrics, etc.		Persons in Auto Trucks Freight & Delivery		Persons on Motor Cycles		Persons on Bicycles		Persons in Carriages, Horseback, etc.		Persons in Horse-drawn Trucks, Delivery, etc.		Pedestrians		REMARKS
Hr.	Min.	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	

Electric Ry. Journal

DENVER TRAFFIC STUDY—FORM OF RECORD USED BY THE DENVER TRAMWAY'S OBSERVERS

In order to see if the traffic conditions were similar during the two days named, the traffic at two locations was observed by the same men on both days. One of these two locations showed a decrease of travel, while the other showed an increase. It was concluded that no great error was involved by combining the records of two days so as to represent a typical day. Tuesday, May 5, was therefore assumed as the typical day. The weather conditions for the days on which observations were taken were good and may be considered as typical for that time of year.

As stated above, the number of vehicles entering and leaving the business district was recorded, as well as the number of persons in the vehicles. The totals of the vehicle count are shown below, together with the average number of persons carried by each class of vehicle.

Class of Traffic	Inbound Trips	Outbound Trips	Total Trips	Per Cent of Total Vehicles	Average Persons per Vehicle
Passenger automobiles	8,489	8,723	17,212	26.0	1.79
Freight automobiles	1,355	1,275	2,630	4.0	1.42
Motorcycles	1,730	1,722	3,452	5.2	1.14
Bicycles	9,325	9,342	18,667	28.2	1.01
Horse-drawn passenger vehicles	1,787	1,672	3,459	5.2	1.36
Horse-drawn freight vehicles	10,447	10,300	20,747	31.4	1.22
Total vehicles	33,133	33,034	66,167	100.0	1.47

The number of vehicles entering and leaving the business district should be practically equal for any one day. The foregoing figures afford an indication of the percentage of error of this investigation.

The most numerous vehicles entering and leaving the business district are the horse-drawn freight vehicles, including delivery wagons of all sorts. This class constitutes 31 per cent of the total number of vehicles. It is surprising to find the bicycles next in number, being 28 per cent of the total, and even exceeding passenger automobiles, which constitute 26 per cent of the total.

Horse-drawn passenger vehicles constitute 5 per cent and motorcycles 5 per cent and freight automobiles 4 per cent of the total. The number of passing bicycles was more than five times the number of passing motorcycles, and the number of passing passenger automobiles was more than six times the number of passing freight automobiles.

Thirteen per cent of the 10,000 daily trips made by automobiles in and out of the district are for freight purposes. Of the total number of automobiles in use in the city, probably about the same percentage are freight autos. Of the horse-drawn vehicle trips, 86 per cent were for freight purposes. Of the total vehicle trips, 35 per cent were for freight purposes. The horse-drawn vehicle trips are in excess of the automobile trips, being 37 per cent of the total number of vehicles, as compared with 30 per cent for the automobiles.

The State law that went into effect in 1913 requires the registration, at the beginning of each year, of all automobiles and motorcycles. The records of the registrations in Denver County are as follows:

Total for 1913	
Individual licenses	4,793
Dealer licenses	175
Total automobiles	4,968
Motorcycles	1,013
Issued Jan. 1 to May 5, 1914.	
Individual licenses	4,630
Dealer licenses	169
Total automobiles	4,799
Motorcycles	927

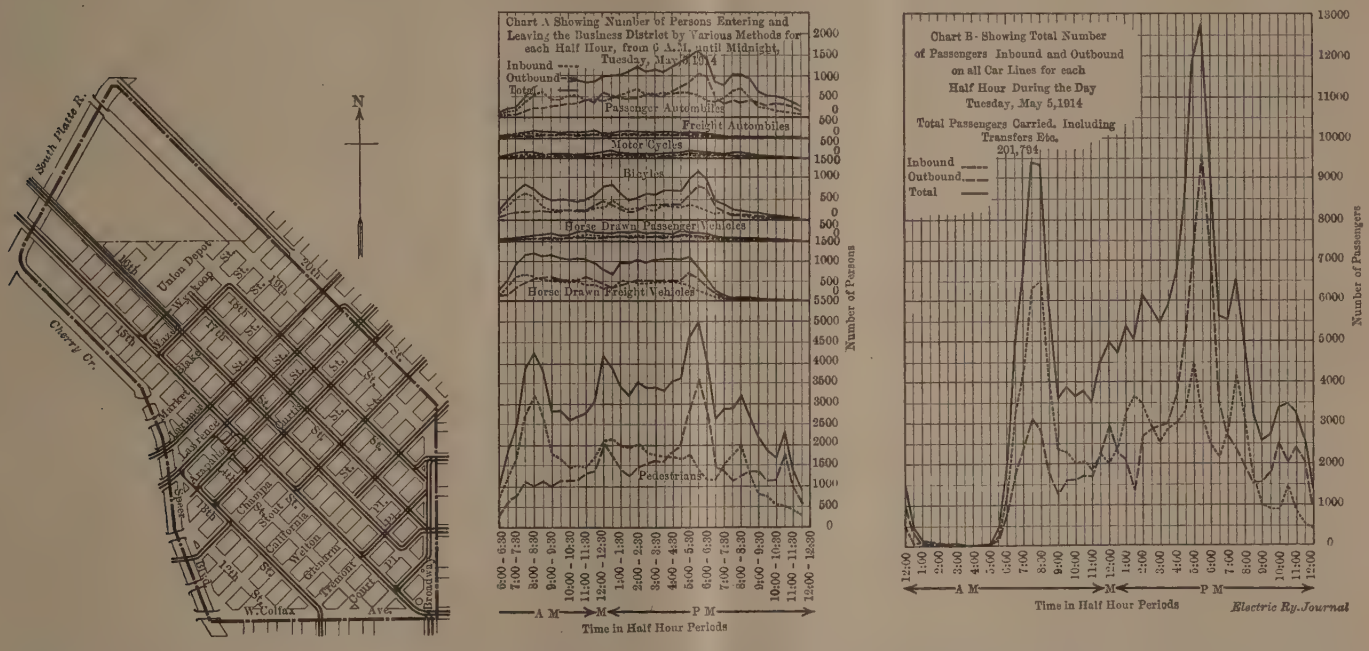
The figures for May 5 represent the number of licenses issued at the time of this traffic investigation. The number of licenses that will have been issued by Dec. 31 of this year will exceed the number issued during 1913. No reliable data are available as to the number of automobiles in use during years prior to 1913.

From the foregoing data it is assumed that about 5000 automobiles and 1000 motorcycles are now in use in Denver. If 13 per cent of the automobiles are in freight service, there are about 650 freight autos and 4350 passenger autos in use in the city.

The number of automobiles and motorcycles entering and leaving the business district is shown below, together with the number of round trips per machine, based upon the estimated number of machines in use:

	Inbound	Outbound	Average Number of Round Trips	Estimated Number in Use	Number of Round Trips per Machine
Passenger automobiles	8,489	8,723	....	....	..
Freight automobiles	1,355	1,275	....	....	..
Total automobiles	9,844	9,998	9,921	5,000	2.0
Motorcycles	1,730	1,722	1,726	1,000	1.7

A certain percentage of the registered automobiles are not in daily use, and a certain percentage of those in use do not reach the business district, so that the actual number of round trips per machine in city use is doubtless more than that here shown. It is also true that some of the automobiles used in the business district are owned and registered in the counties adjoining Denver and are therefore not included in the estimated number of automobiles owned in Denver.


South Platte R.
Cherry Cr.
Union Depot
W. Colfax Ave.
N
Chart A Showing Number of Persons Entering and Leaving the Business District by Various Methods for each Half Hour, from 6 A.M. until Midnight, Tuesday, May 5, 1914
Inbound
Outbound
Total
Passenger Automobiles
Freight Automobiles
Motor Cycles
Bicycles
Horse Drawn Passenger Vehicles
Horse Drawn Freight Vehicles
Pedestrians
Number of Persons
A M
P M
Time in Half Hour Periods
Chart B - Showing Total Number of Passengers Inbound and Outbound on all Car Lines for each Half Hour During the Day Tuesday, May 5, 1914
Total Passengers Carried, Including Transfers Etc.
201,794
Inbound
Outbound
Total
Number of Passengers
Time in Half Hour Periods
Electric Ry. Journal

DENVER TRAFFIC STUDY—THE BUSINESS DISTRICT OF DENVER AND THE TWO TRAFFIC CHARTS MADE TO SHOW THE TRAVEL ON ONE BUSINESS DAY

NUMBER OF PERSONS INBOUND AND OUTBOUND

The combined records of the observations taken at the thirty-six thoroughfares give the total number of persons, entering and leaving the business district daily, as 194,456. The following tabulation shows the total results for each class of traffic, inbound and outbound, together with the percentage that each class of traffic bears to the total traffic. This tabulation includes all classes of traffic with the exception of passengers carried on the electric cars:

Number of Persons Entering and Leaving the Business District Daily by Various Methods, Other than Street Car

Class of Traffic	Inbound	Outbound	Total	Per Cent
Persons in passenger automobiles	15,540	15,264	30,804	15.9
Persons in freight automobiles..	1,938	1,797	3,735	1.9
Persons on motor cycles.....	1,967	1,956	3,923	2.0
Persons on bicycles.....	9,348	9,602	18,950	9.7
Persons in horse-drawn passenger vehicles	2,430	2,280	4,710	2.4
Persons in horse-drawn freight vehicles	12,733	12,611	25,344	13.5
Pedestrians	56,251	50,739	106,990	55.0
Total	100,207	94,249	194,456	100.0

It will be noted that the number of persons inbound is 100,207, while the number outbound is 94,249. The difference of nearly 6000 is seen to be due principally to the pedestrian class, as the number of pedestrians inbound is about 5500 greater than the number of pedestrians outbound. This would indicate that more people walk to business than walk home. There is a similar excess of about 300 in the number of persons carried to the business district in passenger autos.

The inbound and outbound records for other classes of traffic are fairly consistent. The excess of 250 in outbound bicycles is probably due in part to those reaching the business district before 6 a. m., for the charts indicate that bicycle riders are early risers.

The accompanying chart "A" shows graphically the number of persons entering and leaving the business district during each half-hour of the day by each class of transportation. These curves show the peaks due to inbound traffic in the morning, outbound traffic in the late afternoon and traffic in both directions during the middle of the day and also the evening.

Car Traffic

To have made this investigation complete it would have been interesting to have ascertained the number of passengers on each car as it entered and left the business district throughout the day. It is impracticable to get an accurate count of this nature, particularly during the rush hours. The best statistics that are available for comparison with street traffic are the figures of total passengers carried in the city, regardless of the business district.

While this comparison is the best available, it is on a somewhat different basis, since a certain proportion of the passengers carried on cars do not enter the business district. There are a number of factories, shops, industries and minor centers of trade that are not included in the business district. Persons going to these locations may or may not pass through the business district. The car data therefore include all of that class of traffic in the entire city, while the street traffic data are confined to the business district. The passengers carried by interurban lines outside of the city are excluded from the totals.

The percentage of passengers carried by the lines passing through the central loop and the lines passing at various distances from the central loop was found to be as follows:

Passengers carried by lines passing through the central loop	45.5 per cent
Passengers carried by lines passing adjacent to the central loop	17.5 per cent
Passengers carried by lines passing one block from the central loop	30.2 per cent
Passengers carried by lines passing two or three blocks from the central loop	6.8 per cent
Total	100.0 per cent

Chart "B" shows graphically the number of persons riding on the cars during each half-hour of the day. The data for this chart were obtained from the records of the fare registers. These records give the number of passengers carried on each car-trip, inbound and outbound, together with the time of the car at each end of the line. The time that each car crossed the boundary of the business district was then computed and the car-trips were then grouped in half-hour periods. By this method the chart represents the number of passengers carried on cars entering and leaving the business district during each half hour, and the chart is therefore on the same time basis as the other traffic charts. As previously stated, that car traffic includes all passengers carried in the entire city, though a certain proportion of these passengers do not cross the boundaries of the business district.

Six of the thirty-one lines are crosstown lines and no data are available as to the inbound and outbound passengers on these lines, since a single trip across town includes both classes of passengers. The total number of passengers carried by these crosstown lines during each half-hour was divided into inbound and outbound in the same proportion that was found to exist between the inbound and outbound passengers carried on the other lines during the same half-hour of the day.

An examination of the chart showing car passengers leads to the following conclusions:

The morning load was heavy from 6.30 to 9 o'clock, and reached its peak from 7.30 to 8, during which half hour, 9400 passengers were carried, inbound and outbound.

The afternoon load was heavy from 4 o'clock to 6.30, and reached its peak from 5.30 to 6, during which half hour 12,800 passengers were carried, inbound and outbound. The time of these peaks is known to vary with the season of the year, but the chart may be considered typical for a week-day during the month of May.

The outbound traffic shows a small peak from 12 o'clock to 12.30 p. m., and the inbound traffic shows a small peak from 1.30 to 2 p. m. This is caused principally by the lunch hour.

The inbound traffic shows a small peak from 7.30 to 8 p. m. and the outbound traffic shows small peaks from 10 to 10.30 p. m. and 11 to 11.30 p. m. These are principally due to evening entertainments in the business district.

It is to be noted that a peak in the inbound traffic is usually accompanied by a smaller peak in the outbound traffic, and vice versa. This is probably due to two causes: First, the people working outside of the business district move in the opposite direction to those working in the business district; second, transfers issued from an inbound car are generally used on an outbound car, so it is to be expected that both directions of traffic will show peaks at about the same time, due to the large percentage of transfers issued.

General travel is heavier in the afternoon than in the morning, indicating a prevalence of afternoon shopping. The travel during the evening peak is about double the travel at any other time of the day except during the morning peak, and more than double the average travel during the day.

The following is a comparison of the inbound and outbound passengers carried during the day:

Inbound	99,345
Outbound	102,449
Total	201,794

The excess of outbound over inbound is 3104, which is in accordance with the previous statement that many people walk to business and ride home on the cars.

Total Traffic

The total daily inbound and outbound traffic is as follows:

Street traffic, inbound	100,207	
Car traffic, inbound	99,345	
Total inbound		199,552
Street traffic, outbound	94,249	
Car traffic, outbound	102,449	196,698
Total, inbound and outbound		396,250

The number of passengers carried on cars during the "owl" period, from midnight to 6 a. m. and during the remaining eighteen hours, from 6 a. m. to midnight, is as follows:

Passengers carried from midnight to 6 a. m.	2,004	1 per cent
Passengers carried from 6 a. m. to midnight.	199,790	99 per cent
Total passengers carried	201,794	100 per cent

If this same percentage holds true on other classes of street traffic, then the data obtained by this investigation, which are based on the eighteen hours, from 6 a. m. to midnight, represent about 99 per cent of the total street traffic for a twenty-four hour day.

Combining the number of passengers carried by the cars in the entire city with the street traffic in and out of the business district, we have the following totals and percentages:

Method of Transportation	Number of Persons	Per Cent
Street cars	201,794	50.9
Passenger automobiles	30,804	7.8
Freight automobiles	3,735	0.9
Motorcycles	3,923	1.0
Bicycles	18,950	4.8
Horse-drawn passenger vehicles	4,710	1.2
Horse-drawn freight vehicles	25,344	6.4
Pedestrians	106,990	27.0
Total	396,250	100.0

Eliminating the persons traveling in freight vehicles, the totals and percentages are as follows:

Method of Transportation	Number of Persons	Per Cent
Street cars	201,794	54.9
Passenger automobiles	30,804	8.2
Motorcycles	3,923	1.2
Bicycles	18,950	5.2
Horse-drawn passenger vehicles	4,710	1.3
Pedestrians	106,990	29.2
Total	367,171	100.0

It is interesting to note that the number of passengers carried by street cars is about 53 per cent of the above total.

The receipts per passenger carried for the year 1913 averaged 3.89 cents, since the total number of passengers carried includes those riding on transfers, half fares and miscellaneous tickets. If the 30,804 persons going in and out of the business district by passenger automobiles were all carried on the street cars the revenue would be 30,804×$0.0389, or $1,198.28 a day, or $437,372.20 per year, assuming that the automobile passengers average the same throughout the entire year as for the typical week day on which these data were based.

On the estimate, previously stated, that there are 4350 passenger autos in use in the city, the 30,804 passengers carried by these autos are equivalent to an average of 7.1 passenger-trips per auto per day. The loss of revenue per auto is therefore about 7.1 × 3.89, or 27.6 cents a day, or $100.74 a year, assuming the same average daily number of passengers for the entire year.

Travel Compared With Population

For the purposes of this investigation, the population of Denver is assumed in round figures at 200,000. The total number of persons riding on cars and going in and out of the business district daily is shown as 396,250. This is equivalent to approximately one trip, in and out, per person per day. In an average household of four or five persons, one person would go to the business district daily and the other members of the household would go occasionally, averaging perhaps two persons per household going to the business district per day. For the entire city, about 100,000 persons would go to the business district per day. This would result in a minimum of 200,000 trips, in and out, per day. The difference between this figure and the figure of 396,250 given above is probably due to trips out and back at noon time, as shown by the accompanying curves, and to the numerous trips, in and out, of a certain portion of the population. The total result is not far from what would be expected.

The number of passenger automobiles in use, estimated at 4350, is equivalent to an average of one automobile for every forty-six persons. Assuming an average of from four to five persons per household, this is equivalent to an average of one automobile to about ten households.

Commonwealth Edison Company Acquires South Chicago Power House Site

The Commonwealth Edison Company, Chicago, Ill., announces the recording of the deeds covering the purchase of about 24 acres of land in South Chicago, on the east side of the Calumet River near the intersection of the Lake Shore and Pennsylvania Railroad tracks entering Chicago. While it is probable that nothing will be built on the site at present, ultimately it will contain a large generating plant, supplementing the output of the present three large, modern steam-turbine generating plants and smaller stations of an older type. The proposed new station will be located on the Calumet River, the commercial highway for water-borne commerce in the southern part of Chicago. The new site is strategically located with respect to railroad transportation and water for condensing purposes.

It has been assumed that the proposed generating plant would be conveniently located in case the steam railroads in that part of Chicago desired to equip their passenger service for electrical operation. However, Samuel Insull, president of the Commonwealth Edison Company, is quoted as saying that his company has no contract with steam railroad companies to supply electrical energy for the operation of trains and that the location of the new plant has nothing to do with the suggested electrification of the railroads. It is simply a part of the general engineering plans of the company to establish generating stations in advantageous locations in different sections of the city. Of course, the plant will be there for railroads and others to avail themselves of its resources if desired.

English Tramway Employees at War

According to *Electrical Engineering*, a very large number of the employees of electric supply tramway and manufacturing companies of Great Britain are now serving in the army and navy and territorials. In many cases arrangements are being made to continue the full pay of the men in the case of married employees and half-pay in the case of single employees. In other instances the difference between the army pay and ordinary wages is being paid, and in still others the company has guaranteed to look after the wives and families of the men. The tramway undertakings are supplying the largest number of men, probably because so many army reservists find employment in this direction. The names of some of the electric railways, with the number of men sent, follow:

London County Council Tramways, 700 men, and an additional 400 men are liable to be called upon as national reservists.

Glasgow Corporation Tramways, 604 men, including many members of the engineering staff.

Birmingham Corporation Tramways, 340 men.

Manchester Corporation Tramways, 346 men.

Metropolitan Electric Tramways, 233 men.

London United Tramways, 150 men.

Liverpool Corporation Tramways, 400 men.

South Metropolitan Electric Tramways and Lighting Company, 33 men.

Cardiff Lighting and Tramways Department, 59 men.

The European War and Export Trade

Statistics of German and British Export Trade in Electrical Apparatus to Different Countries—Opinions of British Technical Papers on Trade Conditions—South American Business Discussed by Prominent Authorities

BRITISH AND GERMAN EXPORT TRADE

STATISTICS SHOW THE AMOUNT AND DESTINATION OF THE ELECTRICAL EXPORTS

Owing to the suspension of most European mail service, the only foreign technical papers now available are those of England. The general tone of the English technical press is one of optimism. While admitting that the present outlook is too serious to be illumined by more than hope, much satisfaction is found in the steadfast way in which the financial institutions of London and the people affected have met the situation without the precipitation of a panic.

Electrical Engineering in its issue of Aug. 13 presents a digest of a German official return showing under classified headings Germany's chief customers for its export trade. The total exports of Germany to all countries for 1913 were of a value of £14,500,000, and the total weight was 133,855 (metric) tons. If all of the German exports going to Austria, Russia and France, the large Continental countries now involved in the war, is deducted from the total a figure of £12,300,000 is obtained, which represents approximately the trade opened to other countries. English electrical exports to Germany, Austria, Russia, France and Belgium during 1913 were only £511,440, the present loss of which English exporters aim to more than counterbalance by participating in the £12,300,000 of trade now lost to Germany.

Table I.—Showing Volume of German Trade in Pounds Sterling for Electrical Exports to All Countries During 1913.

Generators, motors, transformers and choking coils:	
Machines, etc., up to 25 kg. in weight...£ 144,350	
Machines, etc, from 25 to 100 kg. in weight 361,000	
Machines, etc., from 100 to 500 kg. in weight 721,000	
Machines, etc., over 500 kg. in weight.... 1,599,850	
	£2,826,200
Separate armatures and commutators	393,750
Accumulators and parts	286,850
Cable	1,963,400
Arc lamps and mercury vapor lamps	143,000
Arc lamp carbons	491,300
Spare cases and globes, etc., for arc and mercury vapor lamps	21,600
Projectors and reflectors	97,950
Metal filament lamps	2,251,900
Carbon filament and Nernst lamps	167,650
Telegraphic apparatus	48,200
Telephonic apparatus (excluding wireless)	431,800
Electrical fuses, cut-outs, bells, signaling apparatus, etc.	186,700
Apparatus for wireless telegraphy and telephony	82,100
Electrical devices for lighting, power, etc	3,702,350
Electro-medical and dental apparatus	228,200
Electrical measuring instruments, electricity meters and parts	1,211,500
Primary batteries and parts	154,150
Electrical heating and cooking apparatus and parts	83,750
Asbestos, mica and micanite insulators	56,300
Insulating tubes of paper, etc	163,300

Table I, presented herewith, indicates the volume of German export trade in pounds sterling in various electrical and allied commodities for 1913. It will be noted the chief line of German trade has been electrical devices for lighting, power, etc., amounting in value to £3,702,350. Following this is the trade in heavy electrical machinery, including generators, dynamos, transformers and choking coils, valued at £2,826,200; metal filament lamps, £2,251,900; cable, £1,963,400, and electrical measuring instruments, £1,211,500.

Table II shows how the German trade in generators, motors and transformers, in electrical devices for lighting, power, etc., and in electrical measuring instruments, is divided among the world customers of Germany. These items are selected as being those in the classification most closely allied to the electric railway industry. As indicated in the table, Russia ranks first in volume of trade on a ton basis, but Belgium, Austria-Hungary, Great Britain, Argentina, Italy, Spain, France and Japan are not far behind. The heavy export trade by Germany is along the line of generators, motors, transformers, etc., the total volume being 37,279 (metric) tons, while electric light and power devices follow with 21,553 (metric) tons and electrical measuring instruments with 3321 (metric) tons.

Table II.—Showing Division on Metric-Ton Basis of Three Main Lines of German Electrical Exports to World Countries in 1913.

	Generators, Motors, Transformers and Choking Coils	Electrical Devices for Lighting, Power, etc.	Electrical Measuring Instruments, Electricity Meters and Parts
Russia	3,667	2,924	570
Belgium	3,048	1,465	129
Austria-Hungary	2,107	1,992	353
Great Britain	2,314	1,441	275
Argentina	1,984	1,520	279
Italy	2,148	1,205	375
Spain	3,090	..	249
France	1,859	1,121	184
Japan	2,610	..	91
Holland	1,921	..	91
Brazil	1,777	..	34
Norway	1,552	..	43
British South Africa	1,004	273	14
Switzerland	828	..	106
Chile	822	..	47
Roumania	812	..	26
Sweden	585	..	125
Mexico	567	..	..
Denmark	414	..	134
India	547	..	..
Finland	395	..	46
Dutch Indies	362	..	..
Portugal	305	..	..
China	266	..	20
Australia	129	122	21
Uruguay	158	..	..
Peru	124	..	..
United States	..	..	17
Total weight in metric tons	37,279	21,553	3,321

ENGLISH EXPORT TRADE

The Electrical Review of Aug. 15 devotes considerable space to an analysis of present export trade conditions in England. It is stated that during the present year exports of British electrical goods has been in excess of £500,000 a month, toward which amount European countries contributed only £88,000 worth of purchases. This figure includes countries not directly engaged in war, and in any case it is not greatly in excess of English electrical trade with India alone. Less than 20 per cent of British overseas trade is concerned with Europe and obviously a much smaller proportion with Germany, Austria-Hungary and Russia, the countries which may be regarded as absolutely sealed by the war. The balance of English export trade represents trade with countries far removed from the war, the best customers being India, Japan, Australia, Canada and the South American republics. The distribution of English export trade to all customers is shown by Table III.

Germany has heretofore made a preponderating contribution of English electrical imports. In recent months England received on the average about £275,000 of electrical imports. Of this German imports accounted for £156,000 and Austro-Hungarian for £1,800, France and Belgium contributed between £25,000 and

TABLE III.—SHOWING PRINCIPAL FOREIGN AND COLONIAL ELECTRICAL MARKETS OF GREAT BRITAIN AND AVERAGE MONTHLY VALUES OF ELECTRICAL EXPORTS.

*Europe	£88,000
India	78,000
Australia	74,000
British South African Colonies	45,000
Argentina	45,000
Japan	38,000
Canada	36,000
China and Federated Malay States	27,000
New Zealand	23,000
Brazil	23,000
Remaining Countries of Africa	21,000
Remaining Countries of South America	10,000

*Russia, Germany, Austria-Hungary and Balkan nations, £18,000

£30,000 worth of electrical imports per month. All these competitors in the home market will be seriously affected by the war, but the trade of the United States, which in June exported nearly £60,000 of electrical goods to England, should not be so greatly damaged.

GENERAL ENGLISH TRADE OUTLOOK

MANUFACTURERS EXPECT WAR ULTIMATELY TO RENDER COUNTRY LESS INDUSTRIALLY DEPENDENT UPON CONTINENT

According to *The Electrician* of Aug. 7, the outlook for the electrical trade should become brighter as the first operations of the war are concluded. It is realized that those firms that are now and have been for many years trading in electrical plant, apparatus and materials from the Continent and particularly Central Europe, will have no alternative but to close their doors. Indeed, English inter-trade with the Continent in electrical material, both raw and finished, is said to have already completely ceased. As a result, the minds of British manufacturers have turned toward those outlets of trade which the distant parts of the Empire and other unaffected countries offer. *The Electrician* of Aug. 14 is particularly optimistic in regard to the future of British electrical trade. From inquiries made of the principal electrical manufacturing firms and supply houses, it appears that there has been no unwonted falling-off of trade. It is feared that a few companies will for a period be undermanned, but this is not looked upon as a permanently serious factor. The paper concludes: "The contracting element need feel no uneasiness that there will be any dearth of supplies nor have any doubts that the financial situation will generally favor the continuance of trading. Everything seems to justify the fixing up of a notice in the window of every electrical concern in England —'Business as usual.'"

The general opinion of *The Engineer* is that English manufacturers "must face the difficulties of a temporarily collapsed trade, strong in the conviction that when the war is over their position will be far stronger than it has ever been."

The Electrical Review, in its issue of Aug. 7, states that Canada and the United States may find their financial salvation by reason of the present situation, and the belief is expressed that the future holds such an activity in trade, in metals, in stocks and bonds, as few can remember. The next issue of the paper characterizes as unpatriotic the action of some firms (scarcely any electrical) in issuing circulars broadcast to their clients to the effect that in the future they must have cash with their orders. It is stated with emphasis that no departure should be made from the usual practice with regard to credit accounts unless circumstances arise which render such a move absolutely unavoidable, a contingency at present not anticipated. In concluding, comment is made as follows: "One of the unexpected disclosures effected by the outbreak of the war is the extent to which reliance has been placed by British manufacturers upon supplies of raw material from Germany, as evidenced by the number who have had to close their works for want of it. We trust that the outcome will be the transference of the bulk of this trade to British purchasers of raw material. We believe that the cut-throat competition with which our manufacturers have suffered in the past will be removed, the exploitation of the British dominions and colonies will cease and the large amount of foreign trade will be deferred from the Continent to British workshops."

SOUTH AMERICAN TRADE CONDITIONS

W. J. CLARK EXPLAINS REASONS FOR EUROPEAN INDUSTRIAL SUPREMACY IN SOUTH AMERICA AND FOR POSSIBLE SUCCESS OF UNITED STATES THERE

W. J. Clark, manager of the traction department of the General Electric Company, takes an optimistic view of the ultimate effect of the war upon industrial conditions in this country, but he feels that it will take time to adapt our financial machinery to the new conditions. European financiers have made a diligent study of foreign business for such a long time that Americans cannot expect to learn the art of dealing with South American countries, especially, in a few months. In his opinion a vital feature in the European industrial achievements abroad has been the attention given to the financial standing of individual foreign customers. The status of each as a creditor is carefully studied and suitable terms are made for him. Credits up to two years are sometimes allowed with a reasonable interest rate which can be discounted at home, making a profitable transaction for seller as well as purchaser. Belgium, which has been so far the center of conflict in the present war, has played an important part in the financing of foreign undertakings. It has been to a considerable extent a clearing house for them due to favorable laws, to the supposedly neutral character of the country and to the excellent Belgium consular service. Corporations in other countries invested through Belgium corporations somewhat as though they were holding companies. The capital placed thus outside of Belgium in public utilities of various kinds is at least $1,000,000,000. There are also vast sums invested directly by French, German and other financiers. In South America the public utilities, with the exception of the Pearson, Grace and minor interests, are financed in Europe principally, directly or indirectly, from Germany. To offset the conditions outlined, Mr. Clark believes that, aside from the temporary and possibly permanent conditions produced by the present war, the principal advantages possessed by American manufacturers lie in the quality of their products and the ability of their selling forces. That our manufacturers are beginning to appreciate their opportunity is shown by the activity of the United States Steel Corporation and a few other enterprising organizations.

The General Electric Company does much of its South American business through its London office, opened fourteen years or more ago, largely to handle foreign business. A very large business is done here because London is the natural center for South American trading. The company also controls the South American General Electric Company with headquarters at Buenos Aires and it has regular office headquarters at Rio de Janeiro. In addition a large business is handled by W. R. Grace & Company in the West and Southwest, and by Amsinck & Company in the North.

In discussing the probable effects of the war upon financial and industrial conditions Mr. Clark stated that he expects some small immediate benefits and larger ultimate ones. At first there should be an in-

crease in the demand for small supplies for which the purchaser can pay directly. The present plants must be kept up and supplies will be required at once. Ultimately foreign projects will have to be partially, and possibly largely, financed from America. Europe up to this time has largely financed all foreign undertakings, but America must shoulder part of the burden because European money will be needed at home. As foreign ownership influences trade to a large extent it follows that, as fast as American money is invested abroad, American trade will follow it. South America has little money of its own, hence must depend upon the outside world for capital. The conditions for investment, moreover, are favorable and they are constantly becoming less so in this country, at least so far as public utilities are concerned.

In Mr. Clark's opinion the close of the war will be followed by an influx of very desirable immigrants who will flee from the burdens which inevitably follow a great war. South America will share in this benefit as it did fifty years ago when some of the present prosperous Irish and other families settled there, particularly in the River Plate country. The reaction of the war will probably also be seen in the increased costs of manufacturing in Europe, both in labor and supplies, through high taxes and shortages, due to destruction and non-production. These will act as a protection to American industries, enabling them to offset the results of tariff reductions.

INSTRUCTIONS TO COMMERCIAL TRAVELERS IN SOUTH AMERICA

E. F. COLYER EMPHASIZES NEED OF KNOWLEDGE OF NATIVE LANGUAGE, OF PERSONAL CONTACT WITH CUSTOMER AND OF PROPER SEASONAL TRAVELING

E. F. Colyer, in charge of the Latin-American section of the foreign department of the General Electric Company, has had much experience in Central America and South America. In discussing export trade matters with a representative of the ELECTRIC RAILWAY JOURNAL, he said that no commercial traveler who went to either Central America or South America could do much if he did not know the language spoken in the country visited. In all countries except Brazil, where Portuguese is spoken, and British, French and Dutch Guiana, it is necessary to talk Spanish. Although some of the plants are owned by English or Americans, the miscellaneous trade, except in the large cities, is principally in the hands of native firms. With these a foreigner, who had to talk through an interpreter, could make very little progress, Mr. Colyer believes. This, of course, applies to travelers who are trying to make actual sales. If a representative of an American manufacturer goes to the country merely in order to get information concerning the outlook for his goods, it is not so imperative that he speak the language. It will be found that many of the plants and stores in Central American countries have connections with commission houses in New York and New Orleans.

In offering goods to residents of the Central and South American countries it is most desirable, Mr. Colyer stated, to have letters of introduction in order that a friendly relation may be established before actual business is attempted. As the banks of this country do not often have correspondents there, they are not likely to be of much assistance to commercial travelers. If it is possible to get a letter of introduction to a resident banker or to establish a business connection with him that is an advantage. In all cases the first man to be seen is the American consul. These men are always glad to assist anyone who is on a business trip, and frequently they are able to give much information that is of value. Correspondence between a company and a possible consumer is, of course, a step toward a personal introduction that will be found to be a help.

Mr. Colyer emphasized the fact that much of the business with the greater part of Central and South America is likely to be small in amount and that some time is required to develop the market. He figures the traveling expense of a salesman in Central or South American countries at about $5,000 a year. If a salesman were to attempt to cover the entire field he would find the territory so large that he might easily become discouraged. Business is not transacted in accordance with the practices that prevail here. Often a salesman will not receive a single order until he has been on the ground for weeks.

Mr. Colyer said that with the possible exception of Guatemala, which is more nearly a market for European countries, the Central American countries patronize mainly the manufacturers of this country. Between the commission and jobbing houses and local representatives of American firms, Central America is now well covered by American manufacturers.

In regard to the time of the year when trips should be made by representatives of manufacturers, Mr. Colyer said that it varied with the section visited, but that it was desirable to avoid the rainy season. Clothes suitable for the tropics should be taken, with a light overcoat for the altitudes. On account of the condition of the rivers in Colombia, it is possible to get into the interior of that country readily during only two seasons of the year.

The question of granting credit, Mr. Colyer believes, is not radically different in Central and South America from other countries. A good deal of misinformation has been published about the general necessity of very long credits, which are not the invariable rule. In some lines extended credits must be given, while in others it would be poor business policy. The practice in different markets and in different lines varies widely.

GOVERNMENT MOVES TO SECURE FOREIGN TRADE

AMERICAN AGENTS TO WORK WITH MANUFACTURERS IN STUDYING TRADE CONDITIONS IN SOUTH AMERICA AND THE FAR EAST

An appropriation of $50,000 for promoting the commerce in Central and South America, which for the first time is now available to the Bureau of Foreign and Domestic Commerce for the current fiscal year, is to be used promptly to reinforce the existing service for the development of Latin-American trade, according to the latest *Daily Consular and Trade Report*. Much work has already been done in this field in the line of reports covering current branches of commerce, but now a number of new phases of the trade will be intensively studied by special government agents. Agents will begin field investigations as soon as they can reach their several districts in Central and South America.

The appropriation for commercial attachés of the Bureau of Foreign and Domestic Commerce is also now available and the appointees of this class of trade promotion, those of the government for Rio de Janeiro, Buenos Aires, Santiago and Lima, will be promptly dispatched to their posts as soon as selected.

B. Joachim, special commercial representative of the Department of Commerce, who is about to conduct an investigation in South America in furtherance of American export trade, says that the existing war represents the greatest opportunity American manu-

facturers and exporters have ever had to capture South American markets. Mr. Joachim can for a time be reached through the New York City branch of the Bureau of Foreign and Domestic Commerce. Ralph M. Odell, another commercial agent, sails from San Francisco for Corea on Aug. 29. Mr. Odell is to spend two years investigating Oriental markets in the interests of American exporters. He will devote much of his time to the study of the markets of India as a source for American exports and will also look into the trade conditions and requirements in China and the Straits Settlements.

POINTS REQUIRING CAUTION IN INSTITUTING SOUTH AMERICAN TRADE

G. H. CHARLS MAKES PLEA FOR PROPER CONSIDERATION OF SOUTH AMERICAN TRADE REQUIREMENTS

In an interview with G. H. Charls, assistant secretary and sales manager American Rolling Mills Company, it was stated to a representative of the ELECTRIC RAILWAY JOURNAL that the chief words in connection with the possibilities of increasing United States trade with South America are "utmost caution." American manufacturers thoroughly familiar with the conditions that have prevailed during the past year in all South American countries and even the most representative South American merchants are proceeding cautiously because of the financial readjustment which is occurring there.

South America has relied upon foreign capital to finance practically all of its big undertakings. With the beginning of the Balkan war a money tightness became prevalent. Land speculation drove the price of many properties to twice their real value. Money borrowed from Europe paid for these lands. To-day many owners of fine camps and plantations find themselves in the position of being able to earn just sufficient profit to pay the interest on their loans. Misfortunes in crops have embarrassed these owners seriously. The present war has made it impossible for South American countries to float their loans abroad, and unless the bankers and capitalists of the United States go to their relief dull times will continue to prevail.

Too many, in Mr. Charls's opinion, are aroused to action by the fact that England, Germany and France, who formerly controlled the lion's share of South American business, are now at war. American manufacturers must keep in mind that these same countries consumed a proportional amount of the exported products of all South American nations. These conditions will not tend to lighten the financial situation which was so serious before the European war began. The merchants of Brazil, Argentina and Chile are not accepting orders without full information on the financial standing of their customers, and it will be well for United States manufacturers to follow their example.

According to Mr. Charls, two very important steps must be taken by North Americans to secure a permanent, profitable business relation with the nations south of us. The first is to secure proper shipping facilities. Some important and successful efforts to accomplish this task are now in progress, but all need the hearty support of every manufacturer interested in this field. The second is an awakening of United States bankers and capitalists to the splendid opportunities for profitable investment offered them in South America.

Mr. Charls expressed his regret that one of the large enterprising American railway firms operating in Argentina and Brazil was forced a year ago to appeal to English and French capitalists. The European capitalists, in cases of this kind, require that European products be purchased. Many of the largest systems of railways, rubber plantations, nitrate fields, public utilities, mines, etc., are financed by Europeans on the above basis. Therefore, notwithstanding the recognized superiority of United States products, American manufacturers lose the order. The chairman of one of the largest railway systems in Brazil, whose headquarters are in London, said: "If we intended purchasing $100,000 of material we would dislike very much for $1 of this business to be purchased in the United States if it could be produced in Europe." Too much emphasis cannot be laid on the danger of this impediment to the success of the manufacturers of the United States endeavoring to secure a successful foothold in South America.

Mr. Charls stated that American firms may either improve or endanger their future relations with South American countries by their actions and methods of doing business at this time. In order to gain their confidence manufacturers in this country must send them just what they order to the last detail, do business with them as they are accustomed to doing it, and devote every effort to please and win their respect. This can be accomplished only in one way, said Mr. Charls. Send experienced, tactful representatives speaking fluently the language of the country they visit, to study conditions, to make acquaintances, and, most important, to ascertain the exact requirements of the trade. Then these requirements should be filled without one hint of substitution. By this procedure due caution will be observed, and financial risks minimized on immediate business.

CITIES IN SOUTH AMERICA

The following table gives the names of the cities in South America with a population of 50,000 or more, according to the latest available census reports.

TABLE SHOWING POPULATION OF LARGEST CITIES IN SOUTH AMERICA

Buenos Aires	Argentina	1,331,000
Rio de Janeiro	Brazil	1,000,000
Santiago	Chile	400,000
Sao Paulo	Brazil	400,000
Bahia	Brazil	350,000
Montevideo	Uruguay	252,000
Pernambuco (Recife)	Brazil	150,000
Bogota	Columbia	150,000
Belem (Para)	Brazil	150,000
Rosario	Argentina	150,000
Valparaiso	Chile	150,000
Lima	Peru	140,000
Porto Alegre	Brazil	100,000
La Plata	Argentina	80,000
Quito	Ecuador	80,000
La Paz	Bolivia	80,000
Guayaquil	Ecuador	75,000
Caracas	Venezuela	72,000
Cordoba	Argentina	59,000
Ouro Preto	Brazil	60,000
Tucuman	Argentina	55,000
Georgetown	British Guiana	53,000
Concepcion	Chile	51,000
Mendoza	Argentina	51,000
Medellin	Colombia	50,000
Manaos	Brazil	50,000
Fortaleza	Brazil	50,000

The city treasury of Newark, N. J., has received from the Public Service Railway $173,976.99, which represents 5 per cent of the gross earnings from passenger traffic in the city during the year ending April 31. The company was obliged to pay this as practically a franchise tax in accordance with an old ordinance authorizing a change from horse-car to electricity. The amount is about $5,000 less than that paid the city for a similar purpose last year. Various reasons are assigned for the decrease, one of which is the falling off of traffic during the two big storms of the winter.

Statistics of Electric Railways for 1913

Following its previous practice the ELECTRIC RAILWAY JOURNAL publishes herewith a compilation of statistics of electric railway companies based on the returns given in the *McGraw Electric Railway Manual.* The statistics are compiled from the 1914 edition of the *McGraw Electric Railway Manual* and therefore represent the condition of the industry at the end of the year 1913. As in previous similar compilations the miles of track, the number of cars and the authorized and outstanding capital stock and funded debt are given. The same division as to States and groups of States that has been shown in earlier tables has been

STATE	NUMBER OF RY. COMPANIES	MILES OF TRACK	CARS	CAPITAL STOCK		FUNDED DEBT		TOTAL STOCKS AND BONDS	
				AUTHORIZED	OUTSTANDING	AUTHORIZED	OUTSTANDING	AUTHORIZED	OUTSTANDING
NEW ENGLAND STATES:									
Connecticut	12	1,463.62	3,096	$62,653,100	$61,530,100	$79,506,000	$57,951,000	$142,159,100	$119,481,100
Maine	15	551.99	822	11,622,400	11,408,000	26,690,800	15,204,050	38,313,200	26,612,050
Massachusetts	46	3,495.75	9,786	102,546,050	99,416,950	118,879,000	85,128,700	221,425,050	184,545,650
New Hampshire	14	303.80	444	4,382,800	3,017,000	3,887,000	3,532,000	8,269,800	6,549,000
Rhode Island	12	460.42	1,335	36,819,300	31,593,900	17,328,500	15,553,500	54,147,800	47,147,400
Vermont	10	103.75	145	3,020,000	2,735,800	2,775,000	2,625,000	5,795,000	5,360,800
Total	109	6,379.33	15,628	$221,043,650	$209,701,750	$249,066,300	$179,994,250	$470,109,950	$389,696,000
EASTERN STATES:									
Delaware	6	97.00	210	$11,120,000	$9,180,000	$37,524,000	$6,088,000	$48,644,000	$15,268,000
Dist. of Columbia	7	420.66	1,376	35,000,000	31,878,300	36,990,000	27,722,850	71,990,000	59,601,150
Maryland	12	709.60	2,194	51,450,000	29,249,950	100,955,000	76,318,400	152,405,000	105,568,350
New Jersey	46	1,414.67	3,074	99,609,990	89,335,290	119,242,800	97,373,400	218,852,790	186,708,690
New York	134	5,001.06	17,785	602,548,800	497,498,590	1,378,246,300	703,268,500	1,980,795,100	1,200,767,090
Pennsylvania	237	5,015.53	10,236	362,397,150	336,145,300	440,457,050	257,793,850	802,854,200	593,939,150
Virginia	15	452.47	888	31,665,000	26,647,400	52,060,300	27,766,300	83,725,300	54,413,700
West Virginia	21	444.42	586	22,610,000	17,474,900	71,596,800	18,275,800	94,206,800	35,750,700
Total	478	13,555.41	36,349	$1,216,400,940	$1,037,409,730	$2,237,072,250	$1,214,607,100	$3,453,473,190	$2,252,016,830
CENTRAL STATES:									
Illinois	75	3,597.62	8,623	$207,556,300	$156,805,950	$365,885,073	$264,818,948	$573,441,373	$421,624,898
Indiana	46	2,210.40	2,068	121,815,000	104,587,800	161,232,500	89,323,700	283,047,500	193,911,500
Iowa	24	820.68	1,655	53,380,000	39,922,870	88,016,000	41,389,600	141,396,000	81,312,470
Kentucky	10	525.78	1,123	26,139,750	24,597,050	46,364,000	21,850,800	72,503,750	46,447,850
Michigan	25	1,542.83	2,954	45,890,000	43,410,800	132,814,000	82,597,000	178,704,000	126,007,800
Minnesota	12	626.07	1,164	63,825,000	42,641,000	35,740,000	24,360,000	99,565,000	67,001,000
Missouri	22	1,227.97	2,884	133,898,800	88,788,080	161,352,100	108,571,100	295,250,900	197,359,180
Ohio	86	4,154.04	6,565	259,583,000	209,245,500	275,160,800	137,574,100	534,743,800	346,819,600
Wisconsin	22	751.34	1,060	67,687,000	35,382,000	201,225,000	46,776,400	268,912,000	82,158,400
Total	322	15,456.73	28,096	$979,774,850	$745,381,050	$1,467,789,473	$817,261,648	$2,447,564,323	$1,562,642,698
SOUTHERN STATES:									
Alabama	14	368.08	691	$51,852,000	$30,662,000	$82,725,000	$37,760,000	$134,577,000	$68,422,000
Arkansas	10	123.49	284	26,325,000	13,277,000	29,531,000	11,656,000	55,856,000	24,933,000
Florida	7	162.71	287	6,594,000	5,529,600	11,500,000	4,990,000	18,094,000	10,519,600
Georgia	14	464.23	785	51,664,600	50,866,400	88,790,000	26,239,000	140,454,600	77,105,400
Louisiana	8	289.49	751	54,062,400	31,630,000	96,589,000	34,020,000	150,651,400	65,650,000
Mississippi	11	117.50	187	12,000,000	7,512,670	16,444,400	8,174,000	28,444,400	15,686,670
North Carolina	12	267.51	311	42,450,000	23,733,900	25,925,000	13,310,600	68,375,000	37,044,500
South Carolina	7	112.03	192	16,500,000	13,044,600	16,100,000	8,318,000	32,500,000	21,362,600
Tennessee	12	425.92	930	21,400,000	21,148,000	73,460,000	32,492,000	94,860,000	53,640,000
Total	95	2,330.96	4,418	$282,848,000	$197,404,170	$441,064,400	$176,959,600	$722,912,400	$374,363,770
WESTERN STATES:									
Arizona	5	57.50	46	$4,165,000	$3,773,200	$1,314,800	$1,314,800	$5,479,800	$5,088,000
California	43	2,794.42	5,625	379,763,100	352,130,150	423,991,000	235,143,500	803,754,100	587,273,650
Colorado	16	449.00	769	49,305,000	25,865,900	72,218,000	33,807,000	121,523,000	59,672,900
Idaho	3	102.50	65	30,750,000	30,492,400	5,750,000	1,457,000	36,500,000	31,949,400
Kansas	16	321.09	419	11,450,000	7,458,975	13,885,000	7,553,600	25,335,000	15,012,575
Montana	7	118.86	172	4,045,000	3,280,000	2,500,000	1,951,000	6,545,000	5,231,000
Nebraska	6	246.12	537	22,820,000	12,377,000	16,500,000	11,564,000	39,320,000	23,941,000
Nevada	2	10.30	12	2,000,000	1,000,000	1,000,000	135,000	3,000,000	1,135,000
New Mexico	2	10.50	11	550,000	410,000	160,000	160,000	710,000	570,000
North Dakota	4	25.50	72	500,000	461,000	314,600	314,600	814,600	775,600
Oklahoma	13	247.04	325	22,850,000	10,394,400	26,830,000	8,159,000	49,680,000	18,553,400
Oregon	7	557.95	1,325	51,610,000	40,648,800	157,900,000	54,690,000	209,510,000	95,338,800
South Dakota	3	25.00	35	1,900,000	587,000	500,000	50,000	2,400,000	637,000
Texas	31	921.19	1,380	59,565,000	45,702,000	54,056,000	31,308,000	113,621,000	77,010,000
Utah	5	274.25	376	12,400,000	7,614,700	16,000,000	5,272,000	28,400,000	12,886,700
Washington	18	1,098.31	2,033	105,525,000	68,885,300	92,310,000	32,212,000	197,835,000	101,097,300
Wyoming	2	22.00	28	875,000	875,000	420,000	420,000	1,295,000	1,295,000
Total	183	7,281.53	13,230	$760,073,000	$611,955,825	$885,649,400	$425,511,500	$1,645,722,500	$1,037,467,325
All States	1187	45,003.96	97,721	$3,460,140,440	$2,801,852,525	$5,280,641,823	$2,814,334,098	$5,739,782,363	$5,616 186,625

followed in this case. As the returns for the small companies were included in the 1914 edition of the *McGraw Electric Railway Manual* the compilation is based more nearly on actual figures from the companies and to a smaller degree on estimates than has been the case for several years past. The returns are mainly taken by companies as no systematic attempt has been made to segregate capitalization applicable only to the electric railway in cases where companies operate two or more classes of utilities.

Making A Park Pay

BY W. H. BOYCE, SUPERINTENDENT THE BEAVER VALLEY TRACTION COMPANY, NEW BRIGHTON, PA.

Junction Park until 1913 had been an amusement park on the lines of our company, the Beaver Valley Traction Company. During 1913 we made a contract with the Beaver County Agricultural Association, which had recently been organized, whereby we furnished the grounds and constructed a race track in Junction Park, giving the association a ten-year lease on the grounds. The association in turn built a grandstand with a seating capacity of 3000 and constructed stables, poultry-house, cattle pens and other buildings necessary for the conduct of a county fair.

Although the year 1914 saw the first fair held in Beaver County since 1902 and we experienced such bad weather during the first days of the fair that but two days of racing were possible, the fair was very well attended. The association had about 7000 paid admissions on Thursday, 8500 on Friday and 14,500 on Saturday.

5c
MEET ME AT JUNCTION PARK
5c
"THE GARDEN SPOT OF THE BEAVER VALLEY"
➡NOW OPEN⬅
EVERYTHING NEW
$10,000 Roller Coaster, Roller Skating Rink, Merry-Go-Round, Children's Play Ground
New Restaurant - Splendid Service - Reasonable Prices
Dancing Pavilion under new management
Half Mile Race Track
50 Horses on the grounds
CHAUNCEY-KEIFFER STOCK COMPANY IN THEATRE
$5,000 invested in trees, shrubbery and flowers this year.
IDEAL PICNIC GROUNDS
5c
THIS COUPON GOOD FOR 5c on Merry-Go-Round or Roller Coaster
5c

DODGER WITH IMITATION OF BANK NOTE ON BACK

In rearranging the grounds and constructing the race track we expended approximately $11,000. From our fair week revenue, as compared with the same week in previous years, after deducting all extra operating expenses, such as trainmen's wages, policemen's wages and extra coal consumed, we found that we had earned $1,800, or a little more than 16 per cent on our investment. We also have the promise of a very good fair at Junction Park this September.

In addition to the crowd that the race track brings to the fair, we sought extra business this year by advertising and by employing a park solicitor for a month before Decoration Day. As a result we booked about forty picnics where heretofore we did not exceed more than eight to ten picnics during the season because most of the organizations throughout the Beaver Valley had previously gone to out-of-town resorts. This year we could offer the use of a very fine half-mile track for motorcycle, automobile, bicycle and miscellaneous athletic races. This improvement and others, like the planting of many large shade trees, was a strong inducement in attracting these organizations to us.

Beside the picnics we have had field meets and professional automobile races with such drivers as Eddie Hearne and Louis Disbrow. Altogether, the installation of the race track has proved to be a very profitable investment. Junction Park is located just across the street from our office, shop, carhouse and power station and is about ten minutes run from the Pittsburgh & Lake Erie station (New York Central Lines) at Beaver and five minutes from the Pennsylvania station at New Brighton, so that it is a very desirable spot for a fair ground.

Display window cards announcing the opening of the park were placed in most of the store windows throughout Beaver Valley and in our cars. One form of novelty advertising was the distribution of a pen contained in an envelope, with the appropriate wording to "take a pointer" as to Junction Park; another was imitation money with lettering on one side, as reproduced; and a third was a box of safety matches with picnic and safety advertising. In addition to this, one-sheet posters of the form illustrated were placed in store windows and similar eight-sheet posters were used on billboards.

TYPICAL POSTER ADVERTISING JUNCTION PARK

When our traffic representative was about to close up with a picnic committee which was apparently lagging and undecided, he would send them a pair of 10-cent glasses, secured at a 5 and 10-cent store, with a letter stating that he hoped these glasses would aid them to see their way clear to attend Junction Park.

Provision has been made for the electrification of the Montreal (Que.) Harbor Railways. The cost is estimated at $282,674, with $300,000 for equipment. This year the actual trackage of the electrification will be extended to Pointe aux Trembles. The ultimate terminus of the railway system is Bout de l'Ile, which it is expected will be reached next year. On the south shore 8 miles of electric railway track will be laid.

COMMUNICATIONS

Futility of Heavy Plates for Side Sheathing

PHILADELPHIA, PA., Aug. 19, 1914.

To the Editors:

Referring to your editorial on steel sheathing for car siding in the ELECTRIC RAILWAY JOURNAL of Aug. 15, I append some computations showing the strength and weights of various car sides, as shown in the accompanying cut, which may be of interest to your readers.

Assumed constructions of car siding

Case *A*. The girder siding here consists of a belt rail 3½-in. x ⅝-in. bar, the side sheet of 30-in. x ⅛-in plate and a side sill of 4-in. x 4-in. x ⅜-in. angle. This section is similar to that used in a great many instances, the belt rail being made ⅝ in. thick to facilitate shop work, it being easier to maintain a section of this weight in alignment than with a lighter section. The size of the bottom angle in girders of this kind is determined by the amount of material to be suspended from it and by the construction of the bolsters and other cross members of the car.

Case *B*. The second case is computed on the same section as before except that in determining the center of gravity and the moment of inertia, the side sheet is neglected entirely. For the sake of comparison the belt rail and side sill are made the same as in the first case.

Case *C*. The third case considers a car using the steel construction similar to that in the two foregoing cases with the addition of a side plate or top plate, consisting in this case of an angle. This top plate angle is 3½-in. x 2½-in. x ¼-in. angle with a 3½-in. leg vertical. The belt rail consists of a 3-in. x ¼-in. bar, the side sheet of a 30-in. x ⅛-in. plate and side sill of 4-in. x 4-in. x 5/16-in. angle. The total depth of the girder is 93 in., as shown, which is possibly slightly in excess of the depth of the girder for the average city car but is about correct for cars used in interurban service.

Case *D*. In the fourth case the same girder is considered as in the third case, with the exception that the side sheet is omitted from the computation.

Moments of inertia and section moduli

Case *A*. This computation, using a side plate, gives a total moment of inertia of 1208.9 and a fairly well balanced section, the section modulus at the top being 74.58 and the section modulus at the bottom 87.67.

Case *B*. In the second case, disregarding the side sheet, we get a total moment of inertia of 919.8 and a section modulus at the top and bottom respectively of 53.7 and 71.4.

Case *C*. In this case, using a top plate, we get a total moment of inertia of 8682, the section modulus at the top and bottom respectively of 129.6 and 334. This section takes into consideration the side sheet.

Case *D*. In the fourth case, by disregarding the side sheet, we get a total moment of inertia of 7444 and a section modulus at top and bottom respectively of 126.2 and 219. It is interesting to note in this section that the neutral axis lies above the belt rail, making the belt rail a tension member and allowing the use of a light belt rail, which has been figured.

Stresses and weights

In computing the stresses in the various types, I have assumed arbitrarily an unbalanced moment of 800,000 lb.-in. This is about the average figure for city cars with prepayment platforms. The stresses in the beam as computed in the first case are 10,700 lb. in compression and 9100 lb. in tension, while the stress as computed in the second case, neglecting the side sheet, runs 14,800 lb. in compression and 11,200 lb. in tension.

With the beam as computed in Cases *C* and *D* we find in Case *C* a stress of 6150 lb. compression and 2390 lb. tension, and as figured in Case *D*, again neglecting the side sheet, we get a stress of 6330 lb. compression and 3650 lb. in tension.

It will be noticed that the increase in stress due to the omission of the side sheet is very much less in Cases *C* and *D* than in Cases *A* and *B*.

The weights of the girders are as follows:

In Case *A*, 30.84 lb. per lineal foot.
In Case *B*, 24.04 lb. per lineal foot.
In Case *C*, 30.1 lb. per lineal foot.
In Case *D*, 22.88 lb. per lineal foot.

In Cases *B* and *D*, in computing the weight, a 1/16-in. sheathing was added for weight but was not considered in computing the strength.

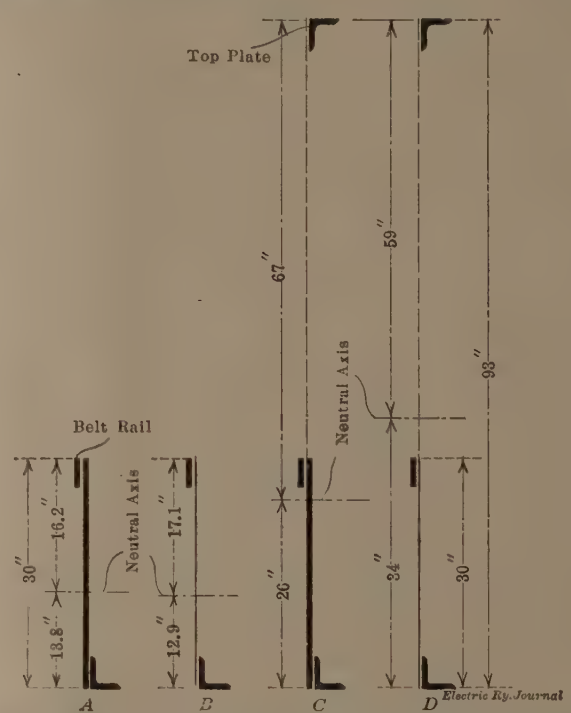


DIAGRAM SHOWING CONSTRUCTION OF FOUR HYPOTHETICAL CASES

The maximum stress for each of these cases is as follows:

Case *A*, 10,700 lb. compression.
Case *B*, 14,800 lb. compression.
Case *C*, 6,150 lb. compression.
Case *D*, 6,330 lb. compression.

Discussion

In making these computations it has been assumed that the posts were applied in the car in such a manner as to prevent buckling of the web due to shear. This is easily accomplished in the average electric car where the post spacing runs from 2 ft. 6 in. to 2 ft. 8 in. centers. Of course, where a girder of the kind considered in Cases *C* and *D* is used, the posts should be of steel, preferably with tee section on account of the great strength for weight and its adaptability to the construction in riveting. In Cases *A* and *B* where the stress in the girder runs high, the shear in the web may be taken care of by angles on each side of the posts where a wooden post is used.

As for the steel sheet, it is hardly necessary to con-

sider it in beam action as it has been considered in Cases *A* and *C* because the sections of the belt rail and sill can easily be made in the average electric car so that the sheet need not be considered at all. Therefore it may be readily seen that where the heavier sheathing is used, sufficient strength is not gained to offset the increase in weight.

A comparison of Cases *A* and *D* gives a good example of what can be accomplished by the use of a top plate, the total difference in weight being approximately 8 lb. per lineal foot, or 480 lb. weight in a car 30 ft. long over the corner posts. Of course, there will be a slight increase in this weight from this figure due to the fact that in any construction of this kind, the posts must be fastened thoroughly at the side sill, belt rail and top plate by means of gussets or otherwise to prevent any loosening of the joints and to develop the full strength of the posts. These connections have not been considered in this calculation, but their weight will be a very small factor in the total and will hardly decrease the total saving in weight by the use of a top plate and 1/16-in. sheathing.

It should be noted that by eliminating the sheathing in computing the strength of the girders it becomes possible to make the side sheet of very light material and in short sections running only between posts or in panels of say two posts each. Then in case of any damage to the side of the car by wagon tongues or accidents of any kind, the sheathing may be easily removed and replaced without disturbing the girder or getting the car out of alignment.

The computations upon which these comparisons were made were accurate in the main but were not carefully carried out to the right of the decimal point. However, I think the comparison thoroughly demonstrates the point brought out in your editorial. Indeed, I believe within the next few years that you will see the light side sheathing come to its own, as I have been told there are electric cars running in England on which aluminum side sheets have been used for effecting reduction in weight. CHARLES J. MCPHERSON.

[The calculations by which the above results were determined accompanied Mr. McPherson's communication. Unfortunately lack of space prohibits their publication, but they are available for anyone who wishes to ascertain in detail how the writer arrived at his conclusions.—EDS.]

CHICAGO, Aug. 21, 1914.

To the Editors:

I have read with interest your editorial of Aug. 15 on the subject of steel car design. Your thoughts regarding the stresses taken by the side sheathing when it acts in a girder are correct, but you state that in the New York cars these sheets take only tensile stresses. This is true of all plate girder designs, the size of plate being selected for its tensile value rather than its value in compression. The compression is taken care of in the top flange as well as in the stiffeners at the girder panel points. I think this same reasoning will apply to the side girder design of car.

Also, fundamentally, that portion of the car body above the sash rail is not properly designed to receive body stresses. In other words, the posts and letterboard form rectangles, like panels of a Pratt truss in which there are no diagonals or tension members. Of course, it is possible to increase the post section and the connections between the posts and the side girder and between the posts and the letterboard to transmit these stresses around the sash opening, but this would require an uneconomical use of metal and, consequently would increase the weight without increasing strength. Hence, I believe that the side-girder design, with the minimum economical thickness of side sheathing and with as light a structure above the sash rail as is consistent with economical maintenance, will provide a car body structure of minimum weight. STUDENT.

[It would be interesting if our correspondent would calculate the stresses due to horizontal shear in the side posts of a car with seven panels between truck centers, neglecting the overhang to simplify the problem and using the admittedly high moment of 800,000 in.-lb. and a 93-in. truss-side construction as assumed in Mr. McPherson's communication published above The weight of gusset plates and posts required to make the top plate effective would then cease to be a matter of personal opinion.—EDS.]

Association News

Secretary Burritt has recently spent some days at Atlantic City arranging the details of meeting rooms for the several associations. An announcement of these details will be given out soon.

The Chicago train committee has arranged with the Pennsylvania Railroad for a first-class, all-steel train to leave Chicago at 5 p. m. Saturday, Oct. 10, arriving at Atlantic City at 4 p. m. Sunday, Oct. 11. Applications for reservations should be sent to E. K. Bixby, Pennsylvania Lines, Chicago, Ill.

The following members have been secured to the Manufacturers' Association in the last week: Mark Mfg. Company, Chicago, Ill.; Hubbard & Company, Pittsburgh, Pa., and Nungesser Carbon & Battery Company, Cleveland, Ohio.

The joint committee held its final meeting for the year in New York on Aug. 26. Those in attendance were W. J. Harvie, chairman, with Allen & Peck; A. S. Richey, professor of electric railway engineering, Worcester Polytechnic Institute; C. L. Henry, president Indianapolis & Cincinnati Traction Company; W. S. Twining, with Ford, Bacon & Davis; Farley Osgood, assistant general manager Public Service Electric Company; P. H. Thomas, consulting engineer; F. B. H. Paine, consulting engineer; W. T. Oviatt, general superintendent Narragansett Lighting Company; Thomas Sproule, assistant engineer Philadelphia Electric Company, and F. H. Bethell, vice-president New York Telephone Company.

The committee considered suggestions which had been received from various members, and the report as originally prepared will be revised and submitted to the company members of the association.

Engineering Teachers at the Westinghouse Works

The fourth in the series of special summer courses for teachers in engineering schools which has been given at the works of the Westinghouse Electric & Manufacturing Company at East Pittsburgh has just closed. Representatives from Stevens Institute, South Dakota State College, Purdue University, Bliss Electrical School, Swarthmore College, Case School, Montana State College, University of Illinois, Virginia Polytechnic Institute, Virginia Military Institute, University of Nebraska, Colorado College, Yale University, Syracuse University, Georgia Institute of Technology and the Ohio State University were in attendance. The teachers were assigned to various departments, including work in the shops and on the test floor, and to investigation in the engineering department. In addition to the actual engineering work there are regular conferences, inspections of different departments of the factory and excursions to outside plants. The course affords an opportunity for teachers to get together to compare notes and become acquainted with some of the recent developments in manufacturing practice.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will be Paid for at Special Rates.)

Overhead Problems—Catenary Construction—I

BY CHARLES RUFUS HARTE, CONSTRUCTION ENGINEER THE CONNECTICUT COMPANY

Catenary construction, hailed on its first appearance as a panacea for overhead troubles, is latterly being regarded with more sanity. For high-speed work on private right-of-way in its best form it is admirable, but for ordinary street work it is at least an inexcusable complication.

The fundamental purpose of catenary overhead is to afford sufficiently frequent support for the contact wire to obviate abrupt changes of direction vertically, and to keep low the stresses in the collector wire while permitting a wide spacing of primary support; on a well-designed system the collector raises the trolley wire very little and runs past a hanger as smoothly as past midspan. Essentially it consists of one or more main supporting members or messengers, from which is suspended either the contact wire, or a secondary messenger system in turn carrying the contact wire. Mes-

Note deflector on third group from left, also insulators on lower chord, with messenger part of circuit

CATENARY CONSTRUCTION—EARLY FORM OF NEW HAVEN BRIDGE

senger spans are usually 150 ft. with wood pole support, and 300 ft. on steel bridges; hanger spacing, an even part of the span, is generally 10 ft. to 15 ft. for pantograph operation, and twice these values for wheel operation. For the 150 ft. spacing with wood poles, spans or brackets but little heavier than those for regular line construction are used. Span support has the marked advantage of causing minimum interference with the view of the engineman, but the sag must be great or the stresses will be very high. For heavy work most engineers have preferred a stiff cross member to the high or heavy poles required for span support. The latter has been used in some of the early light catenary construction and the New York, New Haven & Hartford Railroad has made extensive use of this treatment for yard work, and to a small extent for the main line, employing heavy lattice poles to sustain it; the new Pennsylvania overhead from Philadelphia to Paoli will employ it throughout. The span wire attaches to the main catenary messenger, while a steady strand attached at or near the contact wire prevents overturning under pantograph pressure. In some instances the span has contained a section of structural steel carrying insulators to which the messengers attach. The New Haven type has long wooden strains in the steady strand, very materially stiffening it; the Pennsylvania will also be of this form.

Brackets and Bridges

Brackets are of two classes: those made up of paired angles or channels, separated at one end, to go either

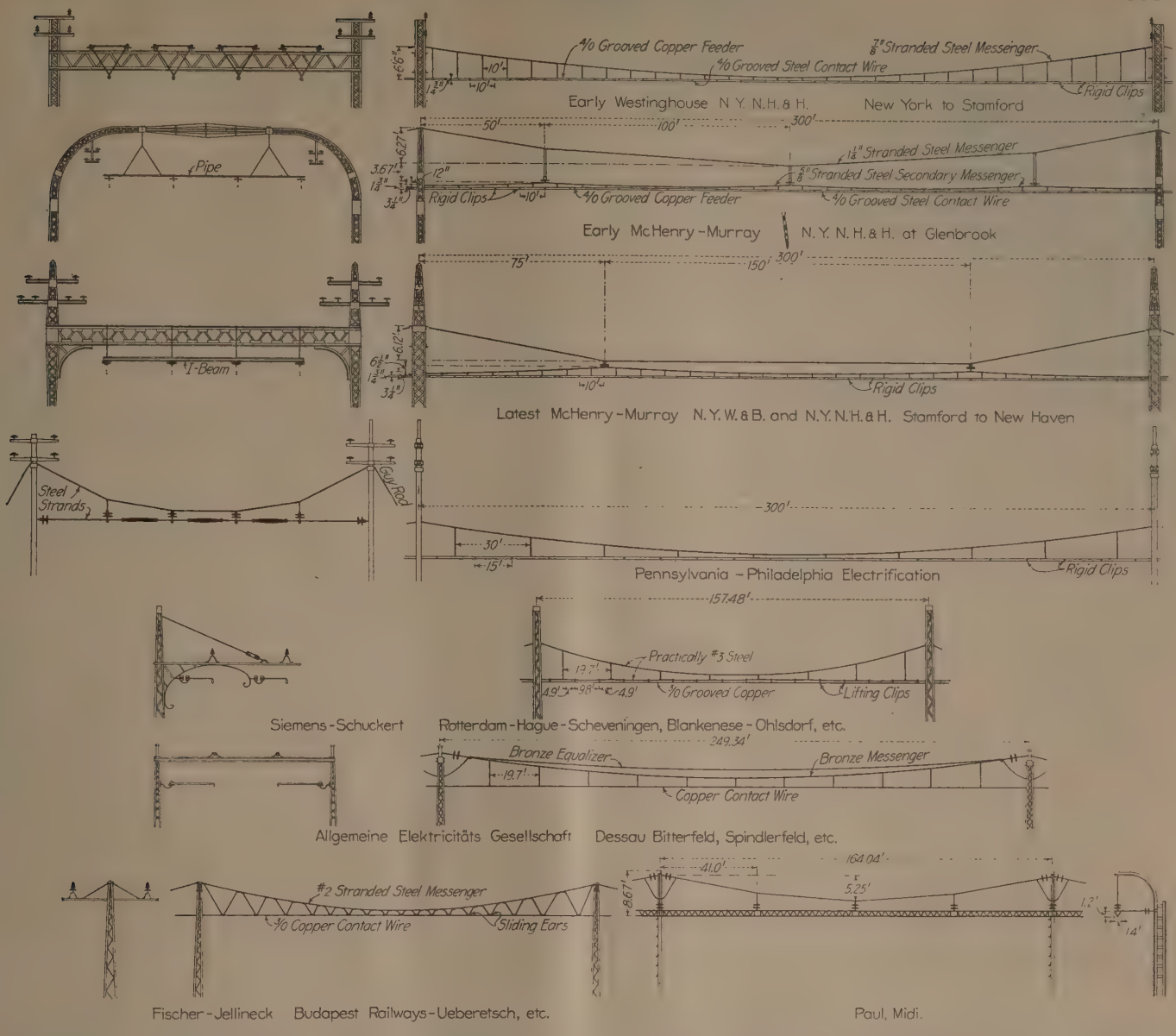
CATENARY CONSTRUCTION—HEAVY NEW HAVEN BRIDGE OF NEW HAVEN-GLENBROOK FORM

side of the pole, to which they fasten by a through bolt, or to clasp a casting lagged or bolted to the face of the pole; and those consisting of a single I or T seating in a suitable pole casting. Paired member brackets offer facilities for the attachment of supports, insulators and the like; single member forms offer much less opportunity for corrosion. Brackets which clasp the pole and are through-bolted to it restrict the length of

Note insulators under the the cross-bents to keep the latter and the main messengers out of circuit.

CATENARY CONSTRUCTION—LATEST FORM OF NEW HAVEN HEAVY BRIDGE

line affected by a break to a few spans either side, but the brackets at the break are usually badly crippled if not completely wrecked; brackets less rigidly secured swing clear, and while dropping a much greater



CATENARY CONSTRUCTION—TYPICAL EXAMPLES OF HEAVY ELECTRIC RAILWAY SUSPENSION ON THE PRINCIPAL SINGLE-PHASE LINES OF AMERICA AND EUROPE

length of line are usually injured little if any. Abroad, brackets on special iron poles are used for spans up to 300 ft., and frequently for double-track work, either with center-pole construction or carrying both trolley wires on the one long arm. In American practice two-track brackets are not so frequently used, spans or bridges being employed instead; the latter are also extensively employed on long span foreign lines.

Bridges have a wide range of design, from the light paired angle irons bolted to wooden poles, one on each side of the track, as on the Midland Railway, England, and certain Continental lines, and the light but rigid entirely structural material frames of the Archbold-Brady type, to the very substantial structures of the early New Haven work. The importance of the traffic involved in the latter case and the lack of data as to behavior in such service fully justified the use of a very conservative design in the pioneer installation.

The Continental tendency to soften lines often leads to ornate curved members and little scrolls on both brackets and bridges, which with our heavy construction would appear decidedly "gingerbready"; the American forms are usually severely plain. An arch, consisting of two latticed curved tapered columns with a trussed spreader, is used on a short experimental section of the New Haven, but the latest bridge with tapered posts, small end down, and curved brackets in the angle between post and girder, has a very pleasing appearance and is more readily fabricated.

CATENARY CHANGES

On the first catenaries the main messengers were carried, alive, on insulators mounted on the supports; better practice, however, is to put the insulators closer to the conductor. The latest New Haven form has grounded main messengers, one for each track which supports I-beams called cross-bents, in turn carrying insulators to which the secondary messengers are attached; the value of this grounded shield as a lightning protection has been strikingly shown in several electrical storms which caused troubles on the older forms, while the new construction in the same territory was entirely unaffected.

The earliest catenary consisted of a messenger from which the contact wire was suspended by a series of equidistant hangers. This worked well for short spans, but on long spans the great difference in length, and so in weight, of the mid and end hangers led to the development of compound catenary. The Siemens-Schuckert type, one of the earliest forms if not the pioneer, employs a main messenger, a secondary messenger suspended from the main messenger by hangers approximately 20 ft. apart, and a contact wire suspended from the secondary messenger by hangers approxi-

mately 10 ft. apart. The secondary messenger supports come at the quarter points between the main hangers or "droppers," which are of wire, about No. 8 gage equivalent, and are in two parts, linked eyes in the adjacent ends forming a flexible joint; these hangers attach rigidly to both main and secondary messenger. The secondary hangers attach rigidly to the contact wire, but loop over the secondary messenger so they are free to rise 2 in. or 3 in. This has proved very satisfactory in a number of Continental installations, and on the Midland Railway of England.

Of about equal age is the Westinghouse multiple catenary, with two main messengers which have vertical sag and horizontal deflection toward each other. The hangers, spaced 10 ft. apart, are equilateral triangles of pipe, the two upper corners attaching to the messengers while the bottom one holds the contact wire; the entire system is at line potential, the supports at the bridges being insulators as well. As first installed on the New Haven road, the contact wire, No. 0000 grooved copper, was carried directly by the triangles. These points, however, were exceedingly rigid while the midspan was comparatively soft, and when the speed of the train was such that the time interval between hanger points was the same as the vibration period of the collector, the latter chattered with increasing violence until changed conditions, which were not infrequently a broken wire, threw the pantograph "out of step."

The trouble was very satisfactorily obviated by a modification suggested by E. H. McHenry, then vice-president, as follows: A steel contact wire of the same section as the copper is suspended from the latter by clips coming midway between the triangles, which keep the wires 1¾ in. apart, center to center. The clips are rigidly attached to both wires; it was feared that with the heavy shoe pressure a looped clip such as is used in the Siemens-Schuckert form might permit the lower wire to turn sideways, in which case the shoe would foul the clips with disastrous results. The London, Brighton & South Coast Railway, to secure the same end, uses triangles of comparatively light wire, the small ones holding the wire by a loop, while the larger ones have jointed sides to give the desired flexibility. On this system the stresses are all low, the messenger having a sag of 6 ft. in vertical projection for a span of not quite 200 ft.

The extensive experience with the pioneer and McHenry forms under heavy service, and careful study of the behavior of other types has resulted in the McHenry-Murray catenary employed on the latest extension of the New Haven electrification. In this the main messengers, one for each track, have at the quarter points structural steel cross-bents which in turn carry insulators from which the secondary system is hung. This latter consists of the secondary messenger, carrying, through hangers 10 ft. apart, a pair of wires, upper of copper and lower of steel, held 1¾ in center to center by clips which are midway between the secondary hangers. The main messengers and the cross-bents are grounded, and the insulators have only to carry the mechanical load of the secondary system.

The Pennsylvania catenary consists of a main messenger for each track, carried by cross-spans. A paired wire like that of the New Haven, except that bronze is used instead of steel for the lower one, is hung from the main messenger, but these hangers are 20 ft. apart and come midway between every other pair of clips, thus cutting down the load materially.

The general tendency in catenary is towards a flexible line, but there are two recent marked exceptions. The Fischer-Jellinek form employed on the Budapest, Ueberetsch and other Austrian lines, has a triangular hanger which lies in the plane of the catenary and carries at the bottom angle an ear through which the trolley wire is free to slide. Continued and repeated use of this form apparently indicates successful results, but it is difficult to believe that even with the light bows employed there is not severe wear at these loose connections, particularly as the triangular hangers of this form, to insure that the clips remain parallel to the contact wire and do not bind on it, of necessity make very hard spots.

This type is hard incidentally rather than by design, but the Paul catenary of the Midi Railway, France, is essentially hard, the messenger supporting a trussed member, which is an equilateral triangle, a contact rail being secured to the lower vertex while pull-offs and steady braces attach to the top which is horizontal. The trusses are a trifle more than 40 ft. long and are suspended by their ends, there being four to the span. This ought to work well; the writer has always contended that it is abrupt change that causes trouble, and that a uniformly hard line would be as satisfactory as a uniformly flexible one, and hoped to see a rigid bar used on the original Westinghouse form; as a new proposition, however, the rigid construction is much more difficult to obtain.

For ordinary service simple catenary meets all requirements. On the Syracuse, Lake Shore & Northern and on the Rochester, Syracuse & Eastern Railways of central New York there have been used spans of 300 ft. on steel bridges of the Archbold-Brady type, the messenger having a sag of 79½ in. with rigid hangers 15 ft. apart. Long span installations are not so common, but spans of 150 ft. with wood pole support are to be found in all parts of the country, the sag for these ranging from 14 in. to 20 in., while the hanger spacing is from 10 ft. to 50 ft.

Bushings for Iron Armature and Axle Bearings

BY R. H. PARSONS, ELECTRICAL FOREMAN

In old-type motors serious trouble with the iron shells, which after being babbitted are used for armature and axle bearings, arises from the dowel holes. As these holes wear out of round and become too large for the dowel pins, they allow the bearing to move in the housing. The consequence is that the shell and housing are soon worn to such an extent that the bearing must be shimmed to secure a snug fit. As these shells are usually made of cast iron, it has not been found entirely satisfactory to fill the worn holes with new material either by the arc welding or oxy-acetylene process. An iron bushing screwed into the shell and drilled out to the proper size will give good results, but the method here described is cheaper and will work to better advantage.

The worn hole should be drilled to 1 in. or any other size that may be necessary to obliterate the old hole entirely, and then a hard brass plug should be driven into the enlarged hole. The length of the plug must necessarily be as great or slightly greater than the thickness of the shell, and the diameter of the plug should be large enough to require some force to drive it in. After the plug has been driven into the hole it should be upset or riveted into the shell by resting the bottom of the plug at the inside of the bearing on some solid base and hammering the top of the plug in order to force it more securely into the shell. The plug should not be tapered.

After the plug is filed on the outer side to conform to the surface of the shell the inside should be tinned. Then when the shell is babbitted, the brass plug will adhere to the babbitt. After being marked at the proper

point, the plug can be drilled to fit the dowel pin when boring out the bearing.

When the plug is so worn again that the hole is too large it can easily be knocked out for replacement by a new one.

The Return Circuit — Selection and Location of Bond

BY HOWARD H. GEORGE, ASSISTANT ENGINEER MAINTENANCE OF WAY, PUBLIC SERVICE RAILWAY, NEWARK, N. J.

An important feature in rail bonding is the proper cross-section for any given length, and the available space beneath the joint plates. While a bond of No. 00 capacity and 8 in. or less in length may prove entirely satisfactory, it would not be possible to obtain satisfactory results with a 500,000 circ.-mil. bond of the same length. To obtain the necessary flexibility it is essential that a bond of such capacity be at least 14-in. in length and preferably from 16 in. to 18 in. For the same reason a No. 0000 bond should preferably not be less than 10 in. long.

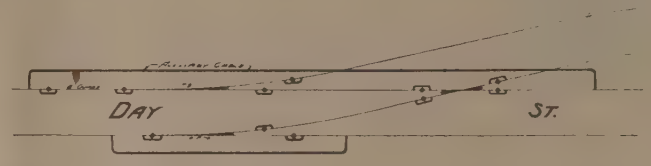
Clearance Under Plates and Proper Length of Bond

The determination of the proper section of bond for any given clearance under the plates cannot be decided by any fixed rule. A safe practice is to allow 1/16 in. as a minimum clearance at all points, and the shape and location of the crimp in the flexible part of the bond must be determined by such conditions as location and size of bolt and bond holes, and whether single or double bonding is to be employed. In connection with the above, it might be mentioned that the plates designed for the standard rails of the American Electric Railway Engineering Association provide adequate clearance for bonds under the plates.

It is probably true that most of the trouble which has been experienced from crystallization and consequent breaking of rail bonds has been due to the fact that the bond used was not flexible enough to provide for the deflection and vibration of the bond under wheel loads and rail movements due to expansion and contraction. Experience has shown that any kind of bond placed beneath the joint plates should be at least 10 in. long, and the general modern practice is to allow for a bond from 12 in. to 16 in. in length. On a 550-volt circuit cross-bonds should be placed approximately every 1000 ft. In cross-bonding the rails of a track, the length of such bonds should be at least 12 in. more than the gage of the track. In the use of exposed bonds, that is to say, bonds which are installed around the outside of the joint plates, such bonds should be at least 10 in., and preferably 12 in., longer than the plates, so that the latter may be removed or the bolts driven with a spike maul and the nuts tightened without danger of injury to the bond.

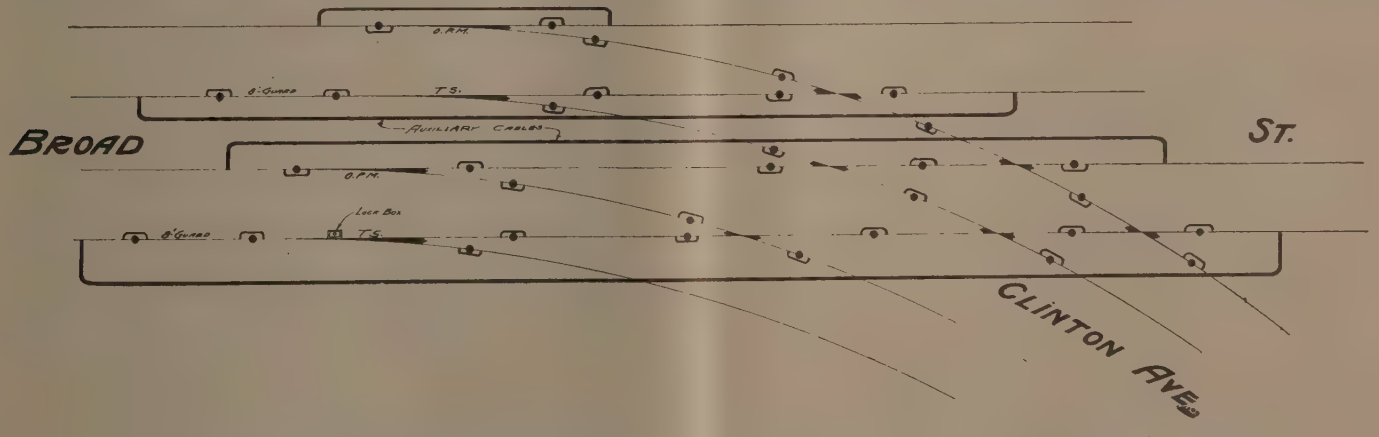
Location of Bond Holes and Relation to Bond Failures

From data collected, it seems to be the general practice to space the terminals midway between the first and second bolt holes, or between the second and third bolt holes. In no case should the bond holes be located close to the ends of the rails, as it has generally been found that the shock from the wheels pounding on the rail ends is dissipated through the copper at the point where it is fixed rigidly to the rail, and this has a tendency to shorten the life of the copper. The increased life and efficiency of the longer bond will generally more than offset the increased cost of the copper as well as the increased energy loss due to increased joint resistance, since the increased flexibility lessens the leverage which the different rail movements tend to exert at the point where the body of the bond joins the head.



RETURN CIRCUITS—PUBLIC SERVICE RAILWAY BONDING INSTALLATION AT A SIDE TURNOUT

Another explanation offered by some for the loosening of bonds is that when the steel contracts, due to temperature changes, it shrinks around the bond terminal and compresses the copper, causing it to flow slightly. Then, when the steel heats up again, the rail expands and leaves the copper terminal slightly loose in the hole through the rail web. This theory, however, is not generally accepted, as it is believed that the copper is greatly hardened when the taper punch is driven through the terminal or when the hydraulic compressor is applied, giving it a much higher elastic limit and thus permitting a much larger deformation to occur without a permanent set taking place.

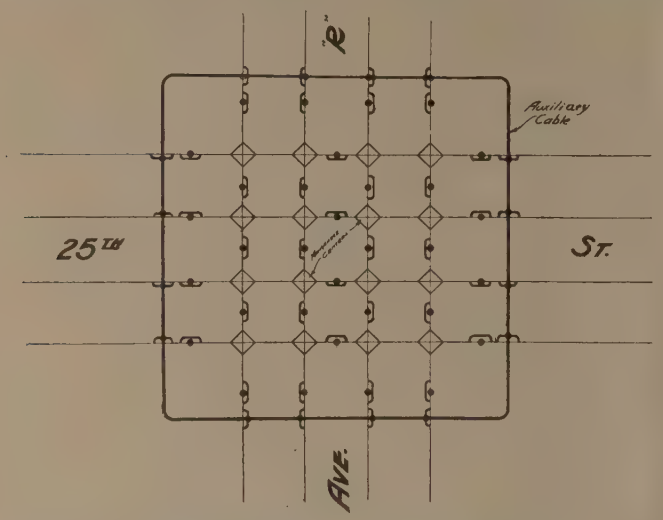


RETURN CIRCUITS—PUBLIC SERVICE RAILWAY BONDING LAYOUT FOR A DOUBLE-TRACK BRANCH-OFF

Resistance of Various Types of Bond Terminals

Relative to the efficiency of various types of bonds, it is interesting to note that tests made by one street railway showed that the resistance of a hydraulic compressed bond was 3.35 per cent less than the resistance of a pin terminal bond of the same length and capacity. Still other experiments made at the same time showed that the contact resistance was decreased about 6 per

cent by the use of mercury amalgam. Of course the hydraulic compressor is a more expensive and complicated piece of machinery than the outfit which is required for the installation of pin terminal bonds, and the labor required might have to be of a higher class, thus making the bonding cost more. The foregoing

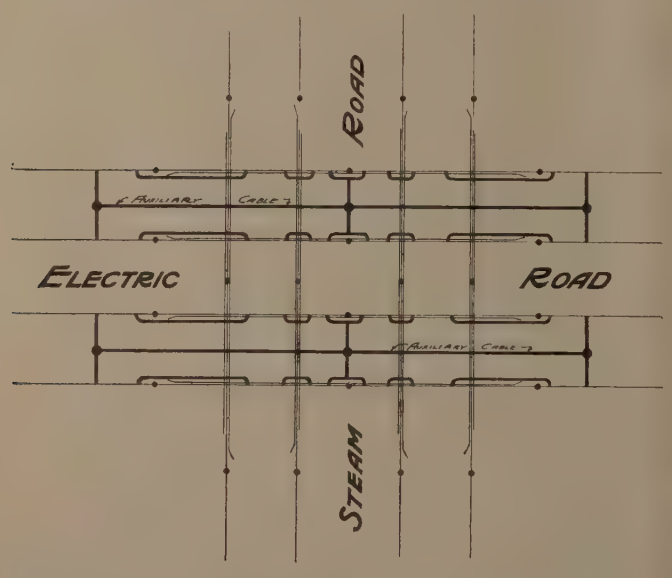


RETURN CIRCUITS—BONDING LAYOUT OF THE PUBLIC SERVICE RAILWAY AT A STREET CROSSING

tests of the relative resistance of bonds of the same length and capacity but with different types of terminals were made as an experiment. Without doubt, they were made under ideal laboratory conditions, but these conditions were alike for all bonds tested and the results obtained are therefore comparative.

Bonding Through Special Work—Equivalent Rail Resistance

One part of the track return circuit which is very liable quickly to lose its efficiency as a conductor is that through the special work. For this reason it is not only



RETURN CIRCUITS—TYPICAL SPECIAL WORK BONDING LAYOUT AT A STEAM-ELECTRIC CROSSING

necessary to bond each individual joint through the entire layout, but it is also necessary to install auxiliary cable bonds running completely through the special work, and connected with the track beyond the limits of the layout. Four accompanying diagrams show the standard method of bonding through some typical special track layouts on the property of the Public Service Railway.

It is customary to express the resistance of a joint in terms of the resistance of a length of unbroken rail. There is a large difference of opinion as to the proper equivalent in determining whether the joints should be rebonded or not. For instance, one of the questions in the American Electric Railway Engineering Association Question Box (*Proceedings*, 1911) asking the proper figure for this purpose, brought twenty-three replies. Four men agreed that 5 ft. of unbroken rail should be used, three thought 6 ft. was the proper figure, and the rest thought still other lengths should govern. Not more than two of the remaining sixteen concurred as to the proper length, their replies ranging all the way up to 12 ft. of unbroken rail. It would not seem proper to adopt any standard equivalent length to cover all conditions, because the length which would be correct for track in the center of a heavily loaded traffic zone or near the power station would be unreasonable for the outer ends of some suburban lines. Therefore it is not just to classify all joints of a certain fixed length as good, and all more than that length as poor. Bonding may be in A-1 shape and still show a resistance reading greater than the established maximum, because such an expression of the resistance of the joint will depend on the length and size of the bond itself, conductivity of the steel rail, temperature, etc. To determine whether the joint should be rebonded or not, the permissible energy loss or voltage drop across the joint must first be established, and, knowing the resistance of a properly bonded joint, the calculation of the maximum permissible joint resistance can easily be made.

Saving Trips to the Stock Room

At the St. John Street shops of the Portland (Maine) Railroad frequent trips of machinists to the stock room are avoided by the storage of drills and arbors in a home-made wall rack shown in the accompanying half-

AUXILIARY DRILL AND ARBOR RACK AT PORTLAND, MAINE

tone. The rack, which is 7 ft. long and 20 in. high, is divided into fifty-six compartments by ⅝-in. separating sticks. It is mounted about 17 in. above the bench near the principal machine tools and has proved a great convenience to employees.

The coal contract for the Cincinnati (Ohio) Traction Company has been closed for the next three years. The business will be divided between the Cabin Creek Coal Company and Matthew Addy & Company, both of Cincinnati.

New Haven Railroad Construction Notes—Pulling 5/8-In. Messenger and Copper and Steel Trolley Wire

BY A FORMER INSPECTOR

The engine, reel car, tool car and coach shown in the accompanying views were used in the electrification of the New Haven Railroad for pulling a 5/8-in. steel messenger, a copper and a steel trolley wire. The reel

THE 5/8-IN. STEEL AND NO. 0000 COPPER AND STEEL TROLLEY WIRES OVER CENTER OF TRACK BEFORE BEING PULLED UP

cars were loaded with one reel of 5/8-in. steel messenger, two reels of No. 0000 copper and one reel of No. 0000 steel trolley. The average length of the messenger wire was 10,000 ft. One view shows the train in operation. At the point where the pull was to be started the train was stopped to bring the tower car under the anchor bridge. A 1¼-in. turnbuckle and a high stress dead-end insulator were then attached to the bridge. Next the 5/8-in. steel messenger was taken up from the reel over the top of the tool car to the top of the tower car and attached to the insulator with an open socket. The copper and steel trolley were brought up in the same manner, made up into coils about 150 ft. long and left on the anchor bridge for connecting to the run from the

TRAIN FOR PULLING 5/8-IN. MESSENGER AND NO. 0000 COPPER AND STEEL TROLLEY IN OPERATION

other side. Then the trolleys were attached to the 5/8-in. steel messenger with Crosby clips. After all wires were thus secured, the train was run ahead to the first I-beam bent of the overhead line, where the 5/8-in. messenger was put into the clamps of the main line insulator, leaving it loose so that the cable would run freely, as shown in one of the views. The copper trolley was tied loosely with a heavy tie wire on one side of the insulator and with the steel trolley wire on the other side so that both trolleys would run freely. This method was repeated to the end of the run. After pulling out the first reel of copper trolley, the wires were pulled up one at a time by the train. A Crosby clip was put over the 7/8-in. messenger cable, and any of the three wires (namely, 5/8-in. messenger, No. 0000 steel or No. 0000 copper) was then put into the U-bolt of the Crosby clip and pulled up until it was tight. Following this, the clip was tightened to hold it in place. After all three wires were thus pulled up and tightened, the train ran ahead and the cable was pulled up and tightened in the same manner. The upper views show the three wires in the center of the track before they were pulled up.

Auxiliary Wiring of Interurban Cars

BY J. N. GRAHAM, MASTER MECHANIC ROCKFORD & INTERURBAN RAILWAY COMPANY

The accompanying table and drawing will illustrate the method used by the Rockford & Interurban Railway for wiring light and pump circuits in its interurban cars. These prints are also used by the shopmen to locate trouble on these circuits. By controlling the marker circuits with three-way switches it is possible to carry either white or green signals on the front of car or no signals, as desired. As the incandescent headlight is also operated with a three-way switch, it can be turned on as the arc headlight is turned off when entering a city where the use of arc headlights is forbidden.

WIRING OF LIGHTS, AIR, ETC., ON THE CARS OF ROCKFORD & INTERURBAN RAILWAY

General: All fuses connected to main trolley.

Air compressor connection: From fuse to switch, from switch to governor, from governor to compressor.

Arc headlight connection: From fuse to switch, from switch to headlight resistance, from resistance to headlight plug.

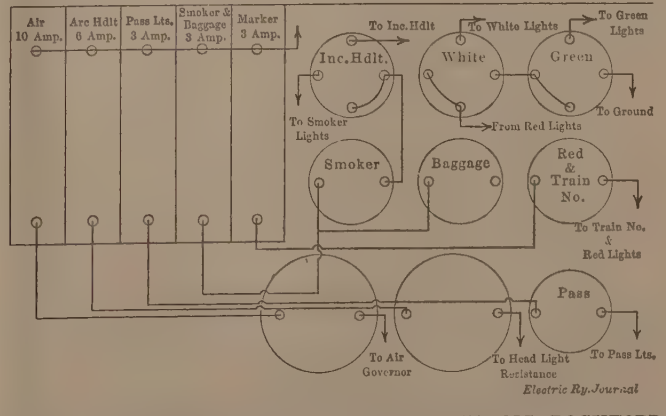
Passenger lights connections: From fuse to switch, from switch to light circuits in passenger compartment of car.

Smoker lights connections: From fuse to switch, from switch to positive pole of three-way switch, from one negative pole of three-way switch to incandescent headlight, from incandescent headlight to smoker lights, from the other negative pole of three-way switch direct to smoker lights.

Baggage lights connections: From fuse to switch, from switch to baggage lights.

Marker lights connections: From switch to train number light, from train number light to red lights and rear platform lights, from rear platform lights to positive pole of first three-way switch, from one negative pole of first three-way switch to white lights, from white lights to ground; from the other negative pole of first three-way switch to positive pole of second three-way switch, from one negative pole of second three-way switch to green lights, from green lights to ground; from the other pole of second three-way switch to ground.

All circuits to be grounded.



PLAN OF SWITCHBOARD FOR AUXILIARY WIRING, ROCKFORD & INTERURBAN RAILWAY'S INTERURBAN CARS

Municipal Railway Machine Shop at San Francisco

All of the repair equipment, now being installed in the Geary Street shop of the Municipal Railway at San Francisco, is driven by direct-connected motors. The railway buys power in the form of direct current at 500 volts for 1 cent per kw-hr. while the rate on other voltages is 3 cents per kw-hr. It was therefore found economical to install in the shop a motor-generator set of 75-kw capacity. This set takes 500-volt current from the supply mains and delivers 230-volt current to the motors in the shop.

The shop equipment includes the following:

One 42-in. Niles wheel-turning lathe, with boring attachment, 30-hp motor.
One 300-ton hydraulic press, 7½-hp motor.
One 24-in. Reed lathe, 7½-hp motor.
One 19-in. Le Blond heavy duty lathe, 5½-hp motor.
One 14-in. Hendy Norton lathe, 2-hp motor.
One 3-ft. Dreses radial drill, 3½-hp motor.
One 20-in. Barnes drill, 1½-hp motor.
One 24-in. Kelley shaper, 5-hp motor.
One No. 7 Racine high speed hack saw, 1½-hp. motor.
One Universal wood working machine, 10-hp motor.
One Beaudry power hammer (300-lb.), 7½-hp motor.
One Bridgeport wet and dry emery wheel, 3-hp motor.
One 2-ton Euclid electric hoist.

Eight Gas-Electric Motor Cars for St. Louis Southwestern Railway

The St. Louis Southwestern Railway is placing in operation the first lot of eight gas-electric motor cars that are now being received from the General Electric Company. At this writing four cars are in use. Car No. 10 is now making the trip between Shreveport, La., and Lewisville, Ark., a distance of 62 miles. Along the route are ten regular stops, seven flag stops and four railroad crossings. The time required for the run is two hours and thirty minutes. The car makes one trip each way a day, totaling 124 miles. Car No. 11 recently made the initial run between Commerce and Sherman, Tex., a distance of 57 miles. The car left Commerce at 8 a. m. and arrived at Sherman at 10.40 a. m. Returning it left Sherman at 4 p. m. and arrived at Commerce at 6.40 p. m.

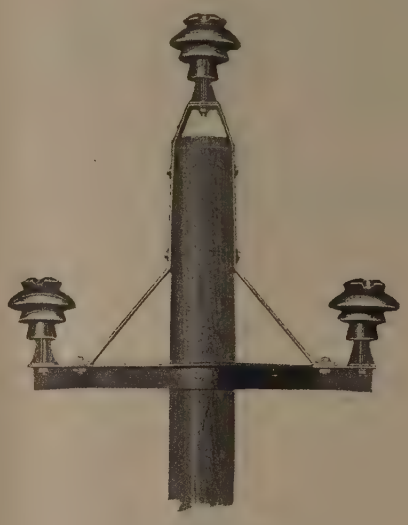
In the formation of the St. Louis Southwestern Railway are included the Pine Bluff Arkansas River Railway, the St. Louis Southwestern Railway of Texas and the Eastern Texas Railroad. It is known as the "Cotton Belt Route" and its total trackage is 1810 miles standard gage. Starting at St. Louis, Mo., it follows a southwesterly direction across Arkansas into Texas. Here at Mount Pleasant one branch terminates at Fort Worth and the other runs through Waco to Comanche and to Stephenville. Branches connect with important centers like Cairo, Ill.; Memphis, Tenn.; Little Rock, Ark., and Dallas, Tex. The equipment of the road comprises 242 locomotives, 235 passenger cars, and 12,445 freight and miscellaneous cars.

All the gas-electric motor cars for this railway are what is known as type RE-70-B-11. The specific dimensions of the St. Louis Southwestern cars are 70 ft. 1⅜ in. over bumpers by 10 ft. 6⅜ in. wide over all. They weigh approximately 49 tons, have a seating capacity for sixty-two passengers, two per seat, and are each equipped with two GE-205, 600-volt, box frame, commutating pole motors having a total of 200-hp capacity. The motors are mounted with nose suspension directly on the axles of the forward truck. The generating unit consists of an eight-cylinder, four-cycle gas engine of the "V" type, direct-connected to a 600-volt, commutating pole generator.

The interior of the cars is partitioned into four compartments. The cab in front containing the power plant apparatus measures 11 ft. 11 in. long; next is the baggage room, 10 ft. 11⅞ in. long; then the smoking section, 12 ft. 5 in. long, and the passenger compartment, 30 ft. 5⅞ in. long. The body of the cars is of all-steel construction, except the seats and interior finish, which are of mahogany. Rear platform entrances are provided. The trucks are of the heavy spring bolster type with elliptic bolster and coil equalizer springs.

Triangular Arms for High-Tension Lines

The Electric Service Supplies Company has placed on the market a new angle-iron cross-arm to be known as the "Keystone" triangle arm. As will be noted in the illustration it consists of an angle-iron cross-arm with braces on either side which are continuous and which form a ridge iron over the top of the pole for a third insulator. The cross-arm proper is shaped to allow the insulators to be on a line with the center of the pole and so that braces and top insulator will also be centered.



TRIANGULAR CROSS-ARM FOR HIGH-TENSION LINE

To install this arm it is necessary only to shave off two sides of the pole at the top so that it will fit the brace, and to bore three holes. The cross-arm proper does not require gaining. This small amount of preparation can be very readily and accurately done by means of a template where a large number of poles are to be erected. On account of the superior bracing qualities of this cross-arm only three ¾-in. through bolts are required to secure it permanently to the pole. On large installations the minimum time necessary to install these triangle arms should result in some appreciable saving.

Triangle cross-arms are made from 3-in. x 3-in. x ¼-in. steel angle and ¼-in. x 3-in. flat steel. They are made for three-phase circuits up to 35,000 volts and for 50,000-volt, three-phase circuits. Their approximate weight is 36 lb. and 49 lb. respectively.

Probably the most important feature of this new cross-arm is its great strength, particularly where the pull is downward or at any lower angle therefrom. This is partly due to the equal distribution of weight on either side of the pole, and finally to the exceptional bracing and the improved design and great strength of every part. Other claims made for this cross-arm are that the bolts are placed through the pole in opposite directions, giving exceptional rigidity to the installation; that the wires are in a true triangle and all in different vertical planes, thus decreasing the possibility of a short-circuit due to the breaking of an upper wire, which short-circuit is quite possible from some of the varied methods now in use for supporting high-tension transmission lines; that a maximum height of pole is secured in that the ridge iron is actually an extension to the pole, thereby allowing a shorter pole for a given height of wires. Ground wire supports or bayonets when used in connection with these cross-arms are attached by means of the two through bolts which support the upper section of the triangle. They are of the off-set type and are made from 3-in. x 3-in. x ¼-in. steel angle.

A Lineman's Grip

A lineman actually requires three hands to do his work efficiently, a hand for each wire and a third to do the tying or splicing. The Western Electric Company's "Buffalo" grip illustrated does the work of a third hand. Its jaws may be clamped open at any

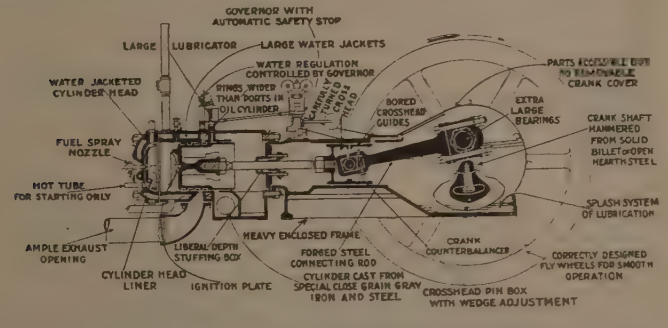
LINEMAN'S GRIP CLOSED

width, the grip held in one hand and the wire inserted, no matter in what position the lineman may be. The locking device makes this possible, while the rest of the construction is such that pulling only serves to strengthen the grip on the wire. The jaws of drop-forged steel will not injure the softest wire or insulation. The grip is made with and without pulley attached. It will hold all sizes of wire, bare and insulated, up to and including No. 0000 B. & S.

A New Valveless Two-Cycle Oil Engine for Low-Grade Fuels

An oil engine of the valveless two-cycle, low-compression type has recently been brought out by the Chicago Pneumatic Tool Company. This engine can be operated successfully on gasoline, kerosene, crude oil or practically any of the intermediate grades of distillates, and it is, therefore, especially adapted for use in operating air compressors or generators in construction work, the design being exceptionally simple so that satisfactory operation is assured notwithstanding the rough handling likely to be involved in such service.

The engine differs materially from the customary form of two-cycle machine, as it is provided with a piston-rod and cross-head instead of the usual trunk-piston. The compressed air for scavenging after each explosion is obtained by the motion of the piston head in a chamber that is separated from the crank case. The crank case, therefore, does not have to be inclosed, and lubrication of the cranks and cross-head is not


GOVERNOR WITH AUTOMATIC SAFETY STOP
LARGE LUBRICATOR
LARGE WATER JACKETS
WATER REGULATION CONTROLLED BY GOVERNOR
WATER JACKETED CYLINDER HEAD
RINGS, WIDER THAN PORTS IN OIL CYLINDER
BORED CROSSHEAD GUIDES
EXTRA LARGE BEARINGS
CRANK SHAFT HAMMERED FROM SOLID BILLET OF OPEN HEARTH STEEL
FUEL SPRAY NOZZLE
HOT TUBE FOR STARTING ONLY
SPLASH SYSTEM OF LUBRICATION
AMPLE EXHAUST OPENING
LIBERAL DEPTH STUFFING BOX
HEAVY ENCLOSED FRAME
FORGED STEEL CONNECTING ROD
CRANK COUNTERBALANCE
CORRECTLY DESIGNED FLY WHEELS FOR SMOOTH OPERATION
CYLINDER HEAD LINER
IGNITION PLATE
CYLINDER CAST FROM SPECIAL CLOSE GRAIN GRAY IRON AND STEEL
CROSSHEAD PIN BOX WITH WEDGE ADJUSTMENT

ELEVATION OF OIL-ENGINE SHOWING COMPRESSION CHAMBER SEPARATE FROM CRANK CASE

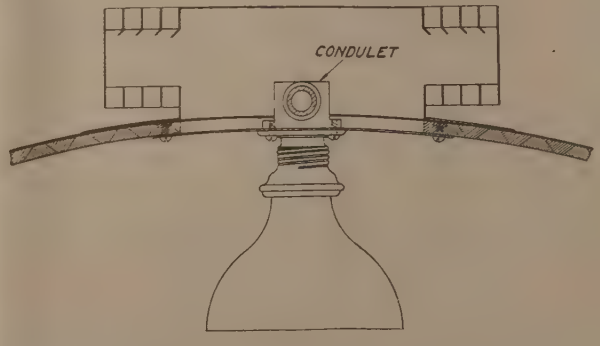
affected by the heat from the cylinder. Ignition is obtained by spraying the fuel, which is forced into the cylinder by a small pressure pump, against a hot plate attached to the piston head, a hot tube being used for starting. With the fuel a quantity of water is injected to reduce the temperature of ignition and the supply of water is regulated automatically by the governor, the supply being proportioned to the quantity of fuel injected.

Ramp-Floor Semi-Convertible Cars for Portland, Maine

The Cumberland County Power & Light Company, operating the electric railway service of Portland, Maine, is equipping ten new cars at its St. John Street shops. The cars are of the semi-convertible type and were built by the Wason Manufacturing Company, Brightwood, Mass. They are designed for prepayment service and are provided with steel underframes and sides up to the belt rail, with an over-all length of 42 ft. 8 in., a seating capacity of forty-four passengers and an over-all width of 8 ft. 3 in. An interesting feature of the design is the use of inclines in the floor for a distance of 6 ft. back of each vestibule, the drop being 3 in. to permit the use of a lower step from the street level. The step heights are 13 in. for each of the first two steps from the ground, the third step being 10 in. high. The steps will fold in conjunction with the vestibule doors, the exit door in the forward end being operated by a pedal under the control of the motorman. The cars are built for double-end operation, each platform being 5 ft. 6 in. long, and are equipped with four GE 40-hp motors each, mounted on Brill 51-E trucks. Johnson fare boxes, Flexolith flooring and Holophane reflectors equipped with 60-watt lamps are among the other features. The interior car lighting is cared for by ten lamps. The fare and transfer register in each car will be operated by pipe levers controlled by pedals mounted above the vestibule floor at the conductor's position, the lever at each end of the car being a ½-in. rod carried inside a 1¼-in. vertical pipe run from the fare box to the roof.

Combined Honeycomb Ventilator and Lamp Fixture

The Railway Utility Company, Chicago, has just put on the market a combined honeycomb ventilator and lighting fixture. The purpose of this fixture is to economize space, and the heating effect of the lamp also aids in ventilating the car when it is standing still. The fixture is easily detached from the supporting condulet, and the connections to the wiring circuit are made on a neat molded block inclosed in the



COMBINATION OF HONEYCOMB TYPE VENTILATOR AND MODERN CAR LIGHTING FIXTURE

condulet, no soldering of joints being required. This provides a substantial construction which eliminates all chance of wiring difficulties. The shade is held by a special design of holder which provides a flexible grip on the shade, easy to manipulate, and a positive lock. This combined ventilator and lamp socket has been adopted by several steam railroads and is used on the low-level, end-entrance cars of the Third Avenue Railway, New York.

News of Electric Railways

Hearing on United Railroads and Solano Project

The hearing being conducted by the California Railroad Commission in the case of the United Railroads of San Francisco was continued on Aug. 24. At the last meeting President Lilienthal of the United Railroads agreed to see what he could do to discover the sources of the money contributed to the Solano Irrigated Farms Company. He was the principal witness at the hearing on Aug. 24. He reported that his examination of the books of the Solano Irrigated Farms Company showed that the company had received $1,180,000 in cash from all sources. This amount included about $292,000 which did not come from Mr. Calhoun, former president of the United Railroads of San Francisco. As the investment from funds of the United Railroads in the Solano project amounted to $1,096,000, this left a balance of about $208,000 which, according to the testimony, had not been accounted for.

At the conclusion of Mr. Lilienthal's testimony the commission advised him to refer these findings to the district attorney. It then instructed its secretary to refer all of the evidence in hand to the district attorney.

The remainder of the hearing on Aug. 24 was devoted to a discussion of the methods of accounting followed by the United Railroads. No recommendation was announced in this matter. At the close of the hearing on Aug. 24 the commission announced that the case against the company was adjourned until Aug. 28.

Need for Cleveland Improvements Misunderstood

In the department "Financial and Corporate," elsewhere in this issue, mention is made of the restoration of the transfer charge by the Cleveland (Ohio) Railway and the statement of earnings of the company for July, 1914, and July, 1913, is published. The charge is made by Councilman William Stolte that the company is spending too much money for carshops and buildings and is not endeavoring to keep the fare at 3 cents. He also accused Peter Witt, street railway commissioner, of recommending the expenditure of too much money and said that with the execution of such plans as have been made the rate could never be maintained because of the excessive interest charges. Councilman J. J. McGinty expressed similar views. It is a fact that the company is investing considerable money in shops and division buildings, but this work was delayed for years by the controversy between the city and company. The criticism has come from members of the Council who have not been in close touch with the history of the road and not from the special committee which did study the matter some time ago. The increase in the deficit is partly due to the charges of $18,000 per month, made for the abandonment of power equipment and cars and restoration of the maintenance fund. Since the company was not free to take care of the loss in its own way, the charge had to be made.

Councilman Robert Koch, chairman of the street railway committee, has announced that he will favor the adoption of a flat rate of three tickets for 10 cents in place of the charge for transfers. He argues that the charge for transfers is unfair. This announcement has provoked some discussion of the zone system.

George R. Davies, president of the local branch of the Amalgamated Association, presented another proposition to the company on Aug. 22. It provides for an increase in wages from 27 cents to 30 cents for first-year men and from 30 cents to 35 cents an hour for the men who have been in the service for more than a year. There is a further provision that the minimum work day shall be eight hours and the maximum day, nine and a half hours, 75 per cent of all runs to be made within twelve consecutive hours and the other 25 per cent within fourteen consecutive hours. This change in hours would necessitate a revision of the schedules and seriously affect the cost of operation. J. J. Stanley, president of the company, said that any proposed arbitration must be made on the basis of the original demands, and on Aug. 25 forwarded a communication to the local union refusing the latest demands for increased wages and readjustment of the length of the work day.

Northampton Strike Settled

The strike of the employees of the Northampton (Mass.) Street Railway, which was begun on Aug. 19, was settled on Aug. 25 through the efforts of Bernard F. Supple, secretary of the Massachusetts Board of Conciliation and Arbitration. An agreement has been signed by the company and the local branch of the Amalgamated Association, under the terms of which all employees were to return to work without prejudice and all motormen and conductors receive an increase of 2 cents an hour above their previous rate of pay, employees in carhouse, line and track departments to have an increase of 2½ cents per hour in wages. Motormen and conductors will now receive a minimum of 25 cents an hour in a graduated scale of wages reaching a maximum of 30 cents an hour at the end of six years' service. An extra daily time allowance of ten minutes will be granted for taking out and putting up cars and making reports to the company. The company agrees so far as possible to arrange its schedules of regular runs on the nine-hour basis. As a result of the agreement, the men gain an increase of 2 cents an hour in all grades over the schedule awarded by the recent board of arbitration, while the company is not obliged to grant the demand for $3,600 in back pay for which the men contended, and the men are required to work on platform time. From June 1, 1914, the men receive increases reaching an estimated total of $3,600 per year and the agreement is to remain in force until June 1, 1916.

Beginning Promised on New Buffalo-Niagara Line

According to the Buffalo *Commercial* the International Railway, Buffalo, N. Y., is planning to carry out at once all the preliminaries looking toward the construction of the proposed Frontier Electric Railway on a private right-of-way between that city and Niagara Falls, first proposed about a year ago. In this connection E. G. Connette, president of the company, is quoted as follows:

"The building up of Buffalo, the Tonawandas and Niagara Falls, the increase of traffic between these cities throughout the year and in addition to that the ever-growing tourist travel to and from the falls have made it necessary to go ahead with such an extension and expansion of the International's interurban service.

"We have realized the advantages of a direct trunk-line high-speed service between Buffalo, the Tonawandas and the falls, but it was inadvisable to build a parallel or additional route across the Niagara frontier until the local inter-communication on the present Niagara Falls route grew to such a point that the traffic there would maintain the old line and give the company an opportunity to develop a separate trunk line service.

"It is well understood that it would be difficult to finance a big undertaking at the present time, but the International Railway is in a position to go right ahead with the first portion of this new interurban service by laying out and grading the roadbed for the new trunk route."

Thirty-Year Railway Power Contract Closed in Texas

The Texas Power & Light Company, Dallas, Tex., has closed a contract with the Texas Traction Company to furnish energy to operate the latter's railway system and has leased the McKinney power plant of the railway company. The contract covers the sale of $100,000 worth of energy annually for thirty years. Lines will be constructed connecting the present "transmission district" of the Texas Power & Light Company with the northern group of cities served by the company. Construction will also be begun soon on the new power plant for the latter company on the Oklahoma bank of the Red River.

At present the Texas Power & Light Company operates in thirty-three Texas communities having an aggregate population of 212,000. Its connected load in lighting aggregates 14,000 kw and in motors 12,401 kw. In addition, it operates 3200 street lamps and sells energy to several interurban railways. This railway load alone amounts to 2300 kw and consumes about 1,300,000 kw-hr. each month.

Cotton gins, oil mills, cotton mills, city water pumping and railroad shops make up the principal classes of its industrial customers, while the company has one user, a cement plant, which, with a connected load of 3500 kw in motors, consumes 2,500,000 kw-hr. per month.

The majority of the thirty-three communities now served by the Texas Power & Light Company lie quite close together geographically, and already some twenty-three of them have been linked by the high-tension lines of the company and compose what is known as its "transmission district." This entire central system is fed with energy from two steam plants at opposite ends of one of the main transmission circuits. The communities outside the present transmission district are now served by individual steam or Diesel-engine plants, but will later doubtless be reached by the high-tension network as this is extended from its present nucleus.

The Opportunity of the Panama-Pacific Exposition

C. C. Moore, president of the Panama-Pacific International Exposition at San Francisco, states that at no time had the directors a thought of postponing the opening date of the exposition on account of the European war. Forty-four states of the Union have made appropriations and are actively engaged in building state pavilions and preparing their exhibits. The various state appropriations are made for a stated period, and a delay in the exposition would necessitate going to the legislatures for more money. The exhibit palaces are completed and the installations have already begun on a large scale. Thirty-four foreign nations have made appropriations and are actively engaged in erecting their official buildings and preparing their exhibits regardless of war, so that any postponement in the exposition would complicate the situation. Of the foreign nations that are now preparing buildings and exhibits, only three are concerned in war, and none of these has indicated that its arrangements for participation will be interrupted. France and Italy have cabled that their preparations to participate are proceeding despite the war. The Argentine government cabled on Aug. 13 that it was preparing to increase its exhibits and accordingly requested the exposition officials to assign additional space. Brazil also cabled that it intended to proceed with larger plans for an exhibit at the exposition. For the first time in its history China has made application to display machinery, and space has been assigned the Chinese Republic in machinery palace in addition to assignments in the other exhibit palaces. The operation of the new regional banks and the added number of ships flying the American flag and making quick time from coast to coast, through the Panama Canal, places the United States in a most favorable position to bring American manufactures to the attention of the distributors and consumers of the world who are at peace.

Hearings on Location of Kansas City Interurban Terminal

Public hearings on the location of the new interurban railway station in Kansas City, Mo., were held during the week ended Aug. 22 by the board of control of the Kansas City Railways. Citizens interested in the various sites presented their arguments, and plans for financing the building were outlined. Several groups offered definite building plans. In most cases the suggestions were for a building of several stories to occupy a block. The board has instituted an investigation of the subject for itself. Among the details which will influence the result are the currents of traffic and the comparative number of transfers as shown by the records. It is said that 40 per cent of the passengers on the interurban railways now transfer to the Kansas City Railways. This would indicate that only 60 per cent would stay on the cars to the station. There is also a large amount of transferring from the city lines to outbound interurban cars. Another factor is the traffic on the interurban railways in connection with the old Union depot in the west bottoms. This will be radically changed, perhaps, when the new union station is opened.

The physical plant of the Kansas City Railways has been improved under the receivers. About three years ago special reports made to the engineers showed that nearly 70 miles of track needed immediate attention, and repairs were begun. The chief trouble was due to paving and the depreciation of the foundation of the rails. It is said now that less than 6 miles need attention. Some heavier rails have been laid, notably near the new union station and in the west bottoms where the cable line will be replaced by electricity.

New Colorado Commission

Governor Ammons, of Colorado, has named George T. Bradley as a member of the State Public Utilities Commission which replaced the State Railroad Commission of Colorado on Aug. 13. When the public utilities law was enacted it provided that A. P. Anderson and S. S. Kendall, two of the members of the Railroad Commission, should be two of the three members of the new commission. Mr. Bradley is the third member. The law was suspended until Aug. 13 through the filing of a referendum petition, but Judge George W. Allen, of the district court, recently held the petition was fraudulent, and enjoined the Secretary of State from submitting the law to the people. The act extends the jurisdiction formerly exercised by the State Railroad Commission, which had control only over railroads, to every form of public service including telephone, water, light, power and telegraph. Mr. Anderson, of the commission, said:

"While the new act requires a much larger office force than we now have, we do not propose to make any very large extension of the force at the present time. The two 'revenue making' sections of the bill are still held up by a petition referring them to the vote of the people at the coming election. The act appropriated $25,000 to maintain the commission, with the expectation that there would be considerable revenue from fees. but these fees will not be forthcoming until after the election, and if the referred sections are defeated we will get no revenue at all until after the Legislature can meet and amend the act."

Improvements in Schenectady

In accordance with its agreement to extend its lines from Schenectady to South Schenectady and to Carman and through the Grand Boulevard if it were not compelled to sell six tickets for a quarter, the Schenectady (N. Y.) Railway has announced that it will soon proceed to make these improvements. The improvements as estimated at that time, and the estimated cost of the improvements to be made in the next three years follow:

Grand Boulevard and double-tracking of lines in Union and Wendell Avenues and Rugby Road	$206,500
Renewals of present rails and overhead construction	194,700
New emergency carhouse	14,000
New machine shop and equipment	100,000
New substation in McClellan Street	102,430
Block signal systems on three interurban lines	75,000
Six new interurban cars	54,000
Ten trailers for city lines	30,000
Remodeling seventy cars into pay-at-entrance type	42,000
Changes in underground and overhead feeder systems	84,125
Changes incident to widening Lafayette Street	96,100
Total	$998,855

Though the statements of J. F. Hamilton, general manager of the company, provide that these improvements were intended to be made within three years, plans already have been made to extend the lines to suburban districts in the near future. The company has also drafted petitions to be sent to the Schenectady Common Council and to the Town Board of Rotterdam at its next meeting.

Brooklyn Subway Section Contract Let

During the week ended Aug. 22 the Public Service Commission for the First District of New York awarded to the Flinn-O'Rourke Company, Inc., the contract for the construction of Section 3 of Route No. 33, the Montague Street portion of the Whitehall-Montague Street tunnel line in Brooklyn. This firm was the lowest of eight bidders at $3,395,152. The bids ranged from the figure given to a little more than $5,000,000. The contractor must begin work within sixty days after the delivery of the contract and give a bond for $500,000. He will have thirty-six months in which to complete the work. This contract is a continuation of the Whitehall-Montague Street tunnel line for operation by the New York Municipal Railway Corporation, and the same company has the contract for building the tunnel.

The third contract for special work for the Fourth Avenue Subway in Brooklyn has been awarded by the commission.

It covers the supply of switches and frogs for certain portions of that subway. The contract went to the lowest bidder, the Pennsylvania Steel Company at $37,426, for final delivery within 100 days.

The commission has advertised for bids to be opened on Sept. 15, for the construction of Section 2 of Route No. 48, the William Street portion of the Park Place, William and Clark Street Subway to be operated by the Interborough Rapid Transit Company. The plans call for a two track underground railroad to be completed within twenty-eight months from the delivery of the contract.

The Third Avenue Railway has begun operation with storage battery cars of the line from Bartow Station on the New York, New Haven & Hartford Railroad to Belden Point, City Island. Eventually the road will be operated by overhead trolley, but for the present eight storage battery cars are used.

Attempt to Organize Baltimore Employees Fails

The attempt that was made to organize the employees of the United Railways & Electric Company, Baltimore, Md., and precipitate a strike in that city has failed dismally. The men who became affiliated with the union were largely trainmen who had been discharged for cause, and the call for a strike which was issued on Aug. 24 at three o'clock ordered the men to quit their cars at 7 p. m. The attempt to stop service resulted only in delay to the cars and in the arrest of about thirty disorderly persons. On the morning of Aug. 25 practically the full force of motormen and conductors reported for duty. The relations of the company with its employees have always been very friendly. William A. House, president of the company, announced that he considered the attempt to array the men against the company not only adverse to the best interests of both the men and the company, but to the riding public as well. That the relations of the company and the employees were satisfactory, he said, was shown by the loyalty with which the men supported the company.

Municipal Ownership Carried at Pekin, Ill.—The proposition to authorize the city to issue bonds to provide funds to purchase, reconstruct and extend the Pekin & Petersburg Railway in Pekin as a municipal undertaking carried at a special election at Pekin, Ill., on Aug. 21.

Extension of City Line Opened in San Francisco.—The Van Ness Avenue line of the San Francisco (Cal.) Municipal Railways has been placed in operation. The branch is 3½ miles long and extends from Market Street and Van Ness Avenue to the Chestnut Street terminus. Seventeen cars have been placed in service, six of them running the full length of Van Ness Avenue and the other eleven running from the ferry to Geary Street and Van Ness Avenue, thence to the exposition grounds.

War Interferes with West Indian Electrification.—The work of reconstructing and equipping the Bridgeton Tramway, Bridgeton, Barbados, West Indies, with electricity will be postponed for the present on account of the war. The property is owned by William B. McKinley, president of the Illinois Traction System, and his associates, and W. R. Morrison, long connected with McKinley properties, was on his way to Bridgeton and had got as far as New York when war was declared. Contracts for part of the material to be used in the reconstruction had been placed with German manufacturers.

Supplementary Bus Service in Seattle.—The utilities committee of the City Council of Seattle, Wash., has recommended for passage a bill appropriating $25,000 from the city stable bond fund for the purchase of five automobile buses, to be operated by the city to connect Divisions "A" and "C." of the Municipal Railway, and run in opposition to the Seattle, Renton & Southern Railway on Fourth Avenue and the lines of the Puget Sound Traction, Light & Power Company on streets where common user rights cannot be obtained without litigation. Transfers will be issued from the buses to the municipal lines.

Hazleton Strike Declared Off.—The strike of the employees of the Lehigh Transit Company, Hazleton, Pa., which was started on Jan. 1, was declared off by the men on Aug. 22. Three of the thirty-eight strikers, members of the grievance committee, voluntarily withdrew from further consideration in the issue and the company agreed to take all of the others back. The charge made by the company against the grievance committee was that its members broke faith with the company when the strike was declared. References to the strike have appeared in the ELECTRIC RAILWAY JOURNAL of Jan. 24, page 201; April 18, page 894; July 18, page 140, and Aug. 8, page 270.

New York City Franchise Abandoned.—The New York (N. Y.) Railways has filed with the Public Service Commission of the First District of New York a declaration of abandonment of its franchise route over what is known as the Roosevelt Street ferry branch of the Madison Street surface line. The route runs from Roosevelt Street ferry to South Street, to James Slip, New Chambers Street, and to the intersection with Madison Street. The company's application for authority of abandonment states that the board of directors authorized the abandonment on May 6, and on July 1 more than two-thirds of the stockholders and upward of two-thirds of the bondholders ratified the action of the board.

Baseball Game Between the Bangharts and the McWhirters.—The annual baseball game between the Bangharts and the McWhirters occurred at Donnelly's, College Point, L. I., last month. The occasion was the annual outing of the McWhirter-Banghart Relief Association. After the game, at which the McWhirters won, a shore dinner was enjoyed. W. O. Wood, president and general manager of the New York & Queens County Railway, was umpire-in-chief. Among those who distinguished themselves during the game were C. S. Banghart and J. S. McWhirter, captains of the respective teams; Major Evans, H. L. Ransom, C. R. Ellicott, W. R. Kerschner, A. Green, C. W. Wilder, F. A. Elmquist, J. J. Dempsey and A. McIver.

Strike in Maryland.—The motormen and conductors in the employ of the Cumberland & Westernport Electric Railway, Cumberland, Md., went on strike on Aug. 19 to enforce their demands for an increase in wages to a uniform scale of 26 cents an hour. This would mean an increase of 1 cent for motormen and 3 cents for conductors. Ferdinand Williams, president of the company, stated that the company was willing to have the Public Service Commission mediate, were the offer acceptable to the men. He said the men could go to work at once, pending the finding of the commission. He added that the company would be willing to give the increase asked by the men if the receipts warranted it, but that this year's income was less and the expenses greater than last year.

Service Resumed in Vincennes.—An appeal to the Federal Court for an injunction enabled S. S. Bush, Louisville, Ky., operator of the Vincennes (Ind.) Street Railway, to resume operation on the lines in Vincennes. Mr. Bush asked that the order be directed against the striking employees, the members of other unions in Vincennes and the city administration. Under protection of the Federal Court, limited operation was resumed pending the hearing on the temporary injunction in the Federal Court in Indianapolis. Mr. Bush is quoted as follows: "We found it necessary to discharge the old employees because they were unfriendly to the company or were intimidated by threats of violence on the part of outsiders. We are putting other men to work as rapidly as we can, though we are not using professional strike breakers to keep the cars moving."

Stone & Webster Men in the War Zone.—A number of Stone & Webster men were in Europe at the recent beginning of hostilities, but so far as is known, all are now outside the immediate centers of military attack. Charles F. Wallace of the Stone & Webster Management Association returned to Boston recently on the *Finland* from England, and E. N. Lake of the Chicago office of the Stone & Webster Engineering Corporation has arrived in Boston after a voyage from Antwerp. J. F. Manning, Frederick Arnold, W. L. Fales, and Henry Houghton of the Boston office were in England at last accounts, as was George Winthrop Lee, librarian of Stone & Webster, who went to Paris in midsummer to attend an Esperanto conference. Mr. Lee was obliged to leave the city twelve hours after his arrival on account of the mobilization of troops. It is expected that Mr. Lee will sail from England for home within a few days and that Messrs. Arnold and Fales will return via the Italian-Mediterranean lines. J. W. Buzzell of the New York office was last heard from in London.

Financial and Corporate

Recent Financial Tendency

As far as the New York Stock Exchange is concerned the policy of the board of governors of "watchful waiting" continued on Aug. 27. The present is the longest period that the New York exchange has remained closed and is the first time in the history of Lombard Street that the London Exchange has suspended. In the panic of 1873 the New York Exchange was closed for ten days. On Aug. 25 it was reported by cable from London that the London Stock Exchange had appointed a sub-committee to consider the advisability of opening. Many suggestions have been made for opening the New York exchange, among them one that the exchange be opened for domestic trading only, under a rule prohibiting buying and selling American securities for account of foreign investors. The recommendation made by Henry Clews was that the exchange be opened on a given day for a limited period, operations to be confined to four designated active stocks.

Some of the influential commission houses in New York are understood to have urged their clients to buy stocks on the cash basis authorized by the exchange. In this connection the return on a number of principal issues on the basis of the closing prices of July 30 has been pointed out, among them Atchison and Steel preferred returning nearly 7 per cent; Brooklyn Rapid Transit 7½ per cent; Steel common more than 9 per cent and Amalgamated Copper better than 12 per cent, to mention only a few.

On Aug. 25 President de Aguero of the Consolidated Stock Exchange in New York, announced that the resumption of trading was being considered by that body, the plan being to confine transactions within a limited range of prices, the minimum being an average of about one point below the closings of July 30, all trades to be for delivery on the following day and no marginal trading to be allowed. The latter rule would eliminate short selling. What the problems are that attach to reopening are indicated by the more than $100,000,000 of European securities dumped on the American market in the last week of trading in New York. The European market absorbs annually about $300,000,000 of American securities, and no less an authority than Sir George Paish, editor of the *Statist*, London, has estimated that $6,000,000,000 of American securities are owned in Europe.

While the matter of opening the exchanges is an important one, the question which at the time this report was being written caused most concern was that of caring for outstanding foreign indebtedness. As regards the restoration of international credits only moderate progress has been made. The national banks and the trust companies necessarily have taken a position against movements of gold that are not essential. In connection with the question of foreign obligations, the suggestion has been made that a clearing house be established for foreign exchange and that all requests for gold to satisfy legitimate commercial credits be referred to the clearing house and that shipments of gold be permitted only in case of necessity. So far interchange credit arrangements have been worked out with France, Italy, Switzerland and Argentina. London still insists upon being paid in gold, wherever obligations contain a provision for payment in that form, and the effort has thus far proved unavailing which was advocated of allowing money owed in England by corporations and banks in the United States being paid here and drawn against for import. In the meantime exports from the United States, while moving now in considerable volume, are still far below the amount needed to offset American debts in the British capital. The question that confronts a number of American railroads with early maturities is whether any of their obligations about to become due are effected by the English moratorium.

It is generally anticipated that the plan worked out by the National City Bank of establishing South American branches will facilitate our trade and tend to enlarge our commercial field. In this respect the direct banking connections made by the Broadway Trust Company, New York, with Japan is of interest. Heretofore importations to Japan have been made through the instrumentality of bankers of London and other European countries. Letters of credit are already being issued under the new arrangement.

According to *Financial America* the most striking feature of the abstract of the condition of the national banks of the United States as to June 30 last, just published in detail by the comptroller of the currency, was the ability of these institutions to preserve their strength in gold holdings notwithstanding the enormous drain of gold to Europe in the first half of the year. For the six months ended June 30, 1914, the net exports of gold in excess of imports was more than $53,000,000 and yet the banks at the end of the month held in gold coin and gold certificates $625,863,069, compared with $592,759,204 on Jan. 13, 1914, as reflected by the comptroller's exhibit, an actual increase of $33.103,865. Compared with the statement of March 4, 1914. the gold holdings on June 30 last fell only $4,789,906. The explanation is offered that in anticipation of a foreign demand the banks operated their accounts so as to displace gold in circulation with silver certificates, as the holdings of silver dollars and silver certificates declined $23,519,980 from Jan. 13 to March 4, 1914, though there was an increase in silver holdings from March 4 to June 30 of $4,259 740. The reduction in this item from Jan. 13 to June 30, 1914, was $19,260,240. The six months' native production of gold was about $45.000,000, assuming an annual output of $90.000.000 gold for the United States. This figure, coupled with the exchange of silver for the more precious metal in the last six months, would have provided a surplus of about $11,000,000 over the gold exports of $53.000,000 in the half-year.

While in individual cases the losses to American trade have been severe, many of the almost wholesale curtailments reported in the daily papers during the early stages seem to have been greatly exaggerated. In the electrical trade only such adjustments have been made as were concomitant with the unprecedented situation with which manufacturers found themselves confronted. The early reports of wholesale automobile and typewriter retrenchment certainly were greatly exaggerated and the interviews with men prominent in New England industry which have appeared in the Boston *News Bureau* do not bear out the early pessimistic utterances. That the grain and the cotton problems are posers none will deny. The problem that confronts the electric railways is largely one of future financing. For the present, at least, one may expect only such important improvement work to be carried out as has already been financed. While the earnings of American public utility companies will probably not suffer materially, except through cessation in industrial work and the consequent loss of traffic, the tendency to go slow has already manifested itself in the suspension of dividends by a number of companies as a means of harboring resources. The cessation of dividends by the Cities Service Company and the Fonda, Johnstown & Gloversville Railroad has already been noted in these columns, and to these companies are added this week the Portland Railway, Light & Power Company, Portland, Ore.. and the Tennessee Railway, Light & Power Company, Memphis. Tenn. Furthermore there is the deferring of action by the trustees of the Chicago Elevated Railways in regard to the expected quarterly dividend on the preferred participating certificates of that company.

The features of the country's foreign trade return for July, made public on Aug. 25, were the new high record for July imports of $160,178.000. and the excess for the month of imports over exports of $6.095,000. July therefore was the fourth consecutive month in which the country's imports have exceeded the exports. Taking the seven completed months ending with July, the export balance stands at only $59,625,000, whereas in the same months last year the exports exceeded imports by $307,907,000. A year ago the July figures showed an export excess of $21.929 000. These figures do not of course cover the period of the European war disturbance except during its preliminary stages in the last week of July.

The emergency shipping bill authorizing the admission of foreign-built ships to American registry was signed by President Wilson on Aug. 22. Regulations under the new law are in course of preparation by the Bureau of Navigation.

ANNUAL REPORTS

New York, New Haven & Hartford Railroad

The New York, New Haven & Hartford Railroad and its associated companies have issued a summarized report of operations for the year ended June 30. In that period the parent company had left, after paying interest and rental charges, only $268,662, as compared to a balance of $8,922,000 reported for 1913. In its introduction to the statements the New Haven says of the net income as reported:

"This represents the amount available for the payment of floating debts, additions, and improvements necessary, but unproductive or only partially productive, such as new stations, and therefore preferably payable out of income rather than from new capital, and for dividends. The fiscal year ended June 30 has been a difficult one for all transportation companies and particularly for those in New England. A summary of the figures shows that the many complications and difficulties to be met by the various properties resulted in balances over fixed charges as follows:

New York, New Haven & Hartford Railroad, surplus	$ 268,662
Central New England Railway, surplus	230,020
New York, Ontario & Western Railway, surplus	663,692
New England Steamship Company, deficit	77,802
Hartford & New York Transportation Company, surplus	85,965
New Bedford, Martha's Vineyard & Nantucket Steamboat Company, surplus	62,708
The Connecticut Company, surplus	1,501,072
The Rhode Island Company, surplus	347,642
Berkshire Street Railway, deficit	72,507
New York & Stamford Railroad Company, deficit	5,824
Westchester Street Railroad, surplus	4,883
New York, Westchester & Boston Railway, deficit	246,923
Housatonic Power Company, surplus	78,506
Westport Water Company, surplus	1,664

"Every property of the New York, New Haven & Hartford Railroad earned its fixed charges except four, including the New England Steamship Company. The Berkshire Street Railroad shows a deficit of $72,507, whereas a year ago the deficit was $91,861, showing an improvement of $19,354. The New York & Stamford Railroad Company reduced a deficit last year of $36,556 to $5,281 this year, showing an improvement of $30,732. The New York, Westchester & Boston Railway (apart from the interest on its bonds and notes) reduced its deficit from $334,554 to $246,923, an improvement of $87,630.

"The statements of income, profit and loss for the New York, New Haven & Hartford Railroad and its subsidiaries are shown in the accompanying table. In connection with these statements the preliminary summary gives the interest of the New York, New Haven & Hartford Railroad in the various subsidiaries as follows: Central New England Railway, 99.8 per cent; New York, Ontario & Western Railway, 50.1 per cent; New England Steamship Company, Hartford & New York Transportation Company, New Bedford, Martha's Vineyard & Nantucket Steamship Company, Connecticut Company, Rhode Island Company, Berkshire Street Railway, New York & Stamford Railway, Westchester Street Railway, Housatonic Power Company and Westport Water Company, sole interest, and New York, Westchester & Boston Railway, 99.6 per cent.

Cleveland Transfer Charge Restored

The report of the Cleveland Railway, made to the directors on Aug. 22, shows the interest account to have been $276,802.05 on Aug. 1. Under the Tayler franchise, the company was entitled to adopt the next higher rate of fare in the fixed scale on that date, but because the figures could not be put into shape until late in August, the higher rate will go into effect on Sept. 1. This change comes about automatically, as the interest fund has dropped below the minimum of $300,000. The rate will now be 3 cents with 1 cent for transfers and no rebate. It will continue until the interest fund reaches $700,000, when it will automatically drop back to the straight 3-cent rate again. The rate taken under the ordinance, however, may not produce a sufficient amount to increase the interest fund to that point and take care of other charges that the company has been compelled to meet. Unless some other plan were adopted, the transfer charge would remain. If found necessary to maintain the interest fund intact a higher rate of fare may be adopted. It is believed, however, that this rate will take care of the expenses and the fund. The charge for transfers is estimated to produce about $800,000 per year.

The monthly reports made by the company for July show the figures based on the ordinance allowances and those based upon actual expenditures, for both 1914 and 1913. These reports are as follows:

Based on Ordinance Allowances

	1914	1913
Operating revenue	$664,869	$629,994
Car mile allowances for maintenance and operation	538,020	487,205
Net operating revenue	$126,849	$142,789
Non-operating income	4,989	1,016
Gross income, less allowances	$131,838	$143,805
Taxes	38,469	38,628
Income, less allowances and taxes	$93,369	$105,177
Interest	142,156	130,369
Deficit	$48,787	$25,192
Special allowances	18,000	.....
Net deficit	$66,787	$25,192

Based on Actual Expenses

	1914	1913
Operating revenue	$664,869	$629,994
Maintenance and operating expenses	601,233	485,825
Net operating revenue	$63,636	$144,169
Non-operating income	4,989	1,016
Gross income, less expenses	$68,625	$145,185
Taxes	38,469	38,628
Income, less expenses and taxes	$30,156	$106,557
Interest	142,156	130,369
Deficit	$112,000	$23,812
Obsolete property	12,000	.....
Net deficit	$124,000	$23,812

TABLE SHOWING STATEMENTS OF INCOME, PROFIT AND LOSS FOR NEW YORK, NEW HAVEN & HARTFORD RAILROAD AND VARIOUS ELECTRIC RAILWAY SUBSIDIARIES.

	New York, New Haven & Hartford Railroad		Connecticut Company		Rhode Island Company		Berkshire Street Railway	
	1914	1913	1914	1913	1914	1913	1914	1913
Operating revenue	$66,703,172	$69,258,950	$8,085,398	$8,454,624	$5,379,148	$5,322,646	$ 994,466	$ 979,068
Operating expenses and taxes	52,083,568	50,942,095	5,767,388	5,868,526	3,896,798	3,561,613	864,577	907,697
Operating income	$14,619,604	$18,316,855	$2,318,010	$2,586,098	$1,482,350	$1,761,033	$ 129,889	$ 71,371
Other income	7,247,989	10,063,785	260,522	62,078	144,658	129,532	2,349	1,430
Gross income	$21,867,593	$28,380,640	$2,578,532	$2,648,176	$1,627,008	$1,890,565	$ 132,238	$ 72,801
Deductions—interest, rentals, etc.	21,598,931	19,458,402	1,077,460	1,039,155	1,279,365	1,220,514	204,745	164,662
Net corporate income	$ 268,662	$ 8,922,238	$1,501,072	$1,609,021	$ 347,643	$ 670,051	*$ 72,507	*$ 91,861

	New York & Stamford Railway		Westchester Street Railroad		New York, Westchester & Boston Railway	
	1914	1913	1914	1913	1914	1913
Operating revenue	$ 371,462	$ 370,100	$ 252,186	$ 242,507	$ 400,910	$ 289,500
Operating expenses and taxes	284,515	320,317	234,013	286,805	559,886	574,547
Operating income	$ 86,947	$ 49,783	$ 18,173	*$ 44,298	*$ 158,976	*$ 285,047
Other income	457	407	205	220	33,772	52,959
Gross income	$ 87,404	$ 50,190	$ 18,378	*$ 44,077	*$ 125,204	*$ 232,088
Deductions—interest, rentals, etc.	93,229	86,747	13,494	10,676	121,719	102,467
Net corporate income	*$ 5,824	*$ 36,557	$ 4,884	*$ 54,753	*$ 246,923	*$ 334,555

*Deficit.

Chicago (Ill.) Elevated Railways.—At the meeting of the trustees of the Chicago Elevated Railways, it was decided to defer action on the declaration of a quarterly dividend of 1½ per cent on the preferred participating shares. Action on the dividend was expected at this time, but no date has been set for any future meeting.

Cincinnati, Lawrenceburg & Aurora Electric Street Railway, Cincinnati, Ohio.—Frank B. Shutts has been appointed receiver of the interests of the Cincinnati, Lawrenceburg & Aurora Electric Street Railway in Indiana. He was appointed receiver of the company in the state of Ohio some time ago.

Cities Service Company, New York, N. Y.—The directors of the Cities Service Company have referred the question of dividends to the executive committee, which will make its recommendation to the board at some future time. Formal announcement was made by the company in the early part of the current month that payment of further cash dividends would be deferred until a reliable forecast could be made of the financial situation and the security markets.

Gary & Interurban Railroad, Gary, Ind.—Willoughby G. Walling recently resigned as trustee of the Gary Connecting Railways and the Gary & Interurban Railway. The directors of the Gary & Interurban Railroad, which is the successor company by consolidation to the above railway, have appointed William P. Abbott to succeed Mr. Walling.

Kansas City Railway & Light Company, Kansas City, Mo.—John B. Dennis, S. L. Fuller, Jerome J. Hanauer and James J. Storrow, composing the committee representing the 6 per cent collateral notes of the Kansas City Railway & Light Company, deposited with the committee at the New York Trust Company under an agreement dated Aug. 15, 1912, announce that interest on the notes from March 1 to Sept. 1, 1914, will be paid on the latter date at the New York Trust Company at the rate of 7 per cent per annum.

Monterey Railway, Light & Power Company, Monterey, Mexico.—The total net earnings of the Monterey Railway, Light & Power Company for 1913 are reported to have amounted to $444,251. After meeting fixed charges and interest on debenture stock and providing for the dividend of 5 per cent on the preferred stock, there remained a balance of $127,251, increasing the surplus brought forward to $601,098, out of which $150,000 has been placed to reserves for contingencies, increasing that fund to $450,000, leaving a credit to profit and loss of $451,098. The loss to the company on account of the disturbed conditions in Mexico is said to be represented principally by diminished earnings. Owing to the unsettled conditions and unknown future, and to the exorbitant rate of exchange upon transfers of money out of Mexico, the directors decided that it would not be in the interest of the holders of the debenture stock to pay the interest due in February, 1914, and a circular to that effect was issued.

Northern Illinois Light & Traction Company, Ottawa, Ill.—The Northern Illinois Light & Traction Company, controlled by the Western Railways & Light Company, reports gross earnings for the year ended June 30, 1914, of $243,207, an increase of $34,505, or 16.53 per cent, over the preceding year. Operating expenses were larger by 9.05 per cent, and net earnings were $115,448, a gain of $23,914, or 26.12 per cent. Interest and other charges were $34,484, an increase of 14.42 per cent, and the surplus, after all charges, was $80,963, a gain of $19,572, or 31.88 per cent.

Pacific Gas & Electric Company, San Francisco, Cal.—As subscriptions have been received for more than 70 per cent of the issue of $12,500,000 of new first preferred stock of the Pacific Gas & Electric Company, the financial plan outlined in a letter to the stockholders under date of June 3, 1914, has been declared operative. Up to Aug. 15 the subscriptions received exceeded $8,750,000 from 3000 subscribers. Many of the subscribers have either paid for their stock in full or have signified their intention of completing the full payment upon allotment, but in view of the disturbed financial conditions the directors have deferred the time of payment of the second installment of $15 a share from Aug. 15 to Oct. 15, of the third installment of $12.50 a share from Oct. 1 to Nov. 15 and of the fourth installment of $12.50 a share from Jan. 1 to Jan. 15, 1915.

Portland Railway, Light & Power Company, Portland, Ore.—In a circular to the stockholders of the Portland Railway, Light & Power Company announcing the passing of the regular quarterly dividend of 1 per cent, which is due at this time and usually payable on Sept. 1, the directors say in part: "The annual report of the company for the year ended Dec. 31, 1913, gave information as to the earnings and financial condition of the company. The figures given showed that the surplus available for dividends upon the stock had been decreasing steadily for two years, owing to business depression, very heavy increase in taxes and increased interest charges. When the report was written on May 1, 1914, it was thought that these unfavorable conditions had about run their course and that gradual improvement might be expected. Up to the present time, unfortunately, the expected improvement has not manifested itself. Under these circumstances, the interests of the stockholders require that the company should conserve its cash resources so as to be prepared for any eventuality, and the directors have accordingly determined to pay no dividend on Sept. 1."

Tennessee Railway, Light & Power Company, Memphis, Tenn.—The directors of the Tennessee Railway, Light & Power Company have decided to defer the usual quarterly dividend payment on the $10,250,000 of 6 per cent cumulative preferred stock. An official statement says in part: "In view of the present unsettled financial and business conditions throughout the world, the board has decided that the only proper policy is to conserve our cash resources in every possible way until the effect of the war is more clearly determined. The regular quarterly dividend on the preferred stock will therefore not be paid on Sept. 1. The dividend of June 1, 1914, was made possible through contributions of the four banking firms which organized the company, without the creation of an obligation of any kind. The earnings during the past year have naturally suffered from the business depression, but it was assumed that with improving conditions due to excellent crops, and the completion of construction work, the company could continue to pay the regular quarterly dividends on the preferred stock. Several large contracts for sale of power were about closed, or under negotiation, and to provide for the increased business expected a contract had been made to purchase a large amount of power from the Brady plant on the Tennessee River, and the construction of the transmission line required for its proper utilization was commenced in May and has just been completed. This will enable us not only to operate most economically, but to take on new power contracts as fast as they can be secured. Owing to the present uncertainty, however, it is impossible to close at this time several large power contracts which were counted on materially to increase the earnings. The retail light and power and the street railway business will depend entirely upon industrial conditions. The company has financed its requirements until June, 1915, when bonds or a note issue must be sold. There would be no difficulty under normal conditions in doing this, but we have no precedents for the present situation, and forecasts of earnings or financial probabilities are of no value. The wise course, therefore, is to keep our cash position as strong as possible."

Washington-Oregon Corporation, Vancouver, Wash.—Federal Judge Cushman at Tacoma has put over until Sept. 21 the question of appointing a permanent receiver for the Washington-Oregon Corporation. The Fidelity Trust Company, Philadelphia, trustee for a mortgage made by the company for $5,000,000, under which $1,563,000 of bonds have been sold, desires to have E. M. Hayden, the temporary receiver, confirmed as the permanent receiver for the railway company.

Dividends Declared

American Railways, Philadelphia, Pa., quarterly, 75 cents, common.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

Northern Texas Electric Company, Fort Worth, Tex., 3 per cent, preferred; quarterly, 1¾ per cent, common.

Terre Haute Traction & Light Company, Terre Haute, Ind., 3 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

Period		Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., June,	'14	$11,458	*$8,870	$2,588	$1,084	$1,503
1 " "	'13	12,101	*8,979	3,121	1,115	2,006
12 " "	'14	121,731	*102,208	19,523	12,868	6,654
12 " "	'13	122,103	*94,892	27,211	12,871	14,339

CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, NOVA SCOTIA

1m., June,	'14	$29,696	*$17,595	$12,101	$6,418	$5,683
1 " "	'13	30,644	*17,913	12,731	6,081	6,649
12 " "	'14	373,646	*207,338	166,307	75,252	91,055
12 " "	'13	373,788	*200,742	173,045	70,311	102,734

COLUMBUS (GA.) ELECTRIC COMPANY

1m., June,	'14	$54,119	*$20,797	$33,322	$26,480	$6,836
1 " "	'13	49,093	*27,387	21,705	23,769	†2,064
12 " "	'14	646,504	*274,090	372,414	299,445	72,977
12 " "	'13	642,711	*294,962	347,749	238,573	109,176

DALLAS (TEX.) ELECTRIC COMPANY

1m., June,	'14	$177,619	*$105,887	$71,732	$35,218	$36,514
1 " "	'13	168,591	*100,490	68,101	24,690	43,411
12 " "	'14	2,279,271	*1,342,137	937,134	325,465	611,669
12 " "	'13	2,008,281	*1,174,350	833,931	295,760	538,171

EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.

1m., June,	'14	$58,250	*$34,201	$24,049	$8,351	$15,697
12 " "	'14	624,413	*381,390	243,023	99,695	143,328

EL PASO (TEX.) ELECTRIC COMPANY

1m., June,	'14	$80,051	*$49,849	$30,202	$4,202	$26,000
1 " "	'13	69,835	*38,775	31,060	4,180	26,880
12 " "	'14	966,815	*532,768	434,047	51,307	382,740
12 " "	'13	865,623	*466,085	399,538	51,547	347,991

FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY, FT. WAYNE, IND.

1m., June,	'14	$159,837	$93,406	$66,431	$53,771	$12,660
1 " "	'13	154,376	92,077	62,299	48,399	13,900
6 " "	'14	917,352	530,282	386,070	311,734	75,336
6 " "	'13	865,545	512,283	353,262	288,139	65,123

GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.

1m., June,	'14	$221,694	*$110,281	$111,412	$35,669	$75,743
1 " "	'13	206,916	*111,907	95,008	34,754	60,254
12 " "	'14	2,457,051	*1,374,886	1,082,164	434,069	648,095
12 " "	'13	2,216,829	*1,273,959	942,869	410,585	532,284

HOUGHTON COUNTY (MICH.) TRACTION COMPANY

1m., June,	'14	$24,507	*$16,610	$7,897	$5,550	$2,347
1 " "	'13	26,162	*14,466	11,696	5,628	6,068
12 " "	'14	288,368	*179,648	108,720	67,140	41,580
12 " "	'13	311,526	*177,861	133,665	67,980	65,685

JACKSON (FLA.) TRACTION COMPANY

1m., June,	'14	$59,531	*$40,570	$18,960	$12,491	$6,469
1 " "	'13	56,702	*36,362	20,339	10,512	9,827
12 " "	'14	730,804	*463,422	267,382	154,503	112,879
12 " "	'13	593,015	*399,550	193,464	126,994	66,407

KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.

1m., June,	'14	$76,738	$38,220	$38,518	$19,682	$18,836
1 " "	'13	70,199	33,058	37,141	19,145	17,996
12 " "	'14	814,293	412,509	401,784	245,183	156,601
12 " "	'13	772,825	401,507	371,318	225,267	146,051

MONONGAHELA VALLEY TRACTION COMPANY, FAIRMONT, W. VA.

1m., June,	'14	$90,857	*$37,615	$53,242	$25,535	$27,707
1 " "	'13	78,737	*27,414	51,323	24,126	27,196
6 " "	'14	494,717	*189,270	305,446	152,946	152,500
6 " "	'13	442,066	*151,655	290,411	144,660	145,751

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1m., June,	'14	$24,613	*$16,272	$8,340	$7,528	$12
1 " "	'13	23,760	*15,446	8,313	7,540	773
12 " "	'14	308,016	*196,515	111,500	91,623	19,877
12 " "	'13	287,203	*190,440	96,763	87,952	8,811

PENSACOLA (FLA.) ELECTRIC COMPANY

1m., June,	'14	$24,363	*$14,868	$9,494	$7,137	$2,357
1 " "	'13	24,050	15,338	8,712	6,604	2,108
12 " "	'14	285,662	*178,361	107,301	85,707	21,594
12 " "	'13	285,832	*180,582	105,249	76,752	28,497

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m., June,	'14	$668,255	*$413,509	$254,745	$176,658	$78,087
1 " "	'13	683,956	*402,562	281,393	171,961	109,432
12 " "	'14	8,701,960	*5,059,171	3,642,788	2,096,611	1,546,177
12 " "	'13	8,377,564	*4,901,470	3,476,094	2,025,892	1,450,202

SAVANNAH (GA.) ELECTRIC COMPANY

1m., June,	'14	$73,014	*$49,122	$23,892	$22,646	$1,246
1 " "	'13	69,390	*45,772	23,618	22,576	1,042
12 " "	'14	848,180	*564,169	284,010	273,782	10,228
12 " "	'13	787,028	*558,879	228,148	224,549	3,599

TAMPA (FLA.) ELECTRIC COMPANY

1m., June,	'14	$81,685	*$44,011	$37,673	$454	$33,219
1 " "	'13	69,773	*41,201	28,572	4,528	24,044
12 " "	'14	933,560	*514,778	418,781	55,701	363,080
12 " "	'13	779,434	*413,389	366,045	55,140	310,905

VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.

1m., June,	'14	$442,193	$221,775	$220,418	$135,828	$84,590
1 " "	'13	426,512	197,876	228,636	128,209	100,427
12 " "	'14	5,236,957	2,565,908	2,671,049	1,615,459	1,055,590
12 " "	'13	4,950,810	2,416,988	2,533,822	1,500,501	1,033,321

*Includes taxes. †Deficit.

Traffic and Transportation

Safety Zones in Louisville

The Louisville (Ky.) police department, in conjunction with the officers of the Louisville Railway, is making a test of the safety zone standards at Fourth and Walnut Streets, perhaps the busiest corner in the city. The moveable standards, with heavy iron pedestals and topped by a red metal flag with the words "Safety Zone" painted on them in white, have been placed on Fourth Street, about 50 ft. from the intersections and between the curbing and the street railway tracks on the sides at which the cars stop to discharge and take on passengers.

Samuel Riddle, superintendent of the Louisville Railway, agreed to co-operate with the police department, and the experiment is being tried out with interest not only to the police but to the owners and users of vehicles. If the trial at Fourth and Walnut Streets proves successful, similar standards will be placed at other busy corners in the retail section of Fourth Street, such as at the Chestnut Street and the Green Street intersections. At other corners the standards will need to be placed only on Fourth Street as that is narrow while the cross streets are exceptionally wide and give room enough for traffic to pass and people to board and leave cars at the same time.

A city ordinance prohibits any vehicle passing a street car which has been stopped to discharge or take on passengers, but the ordinance has been violated, especially on outlying streets where no traffic police are stationed. Recent accidents at downtown corners have prompted the trial of the standards, and, it is said, if they prove desirable, the system may be extended to include the intersection corners and transfer points of the Louisville Railway lines elsewhere in the city than the heart of the business section.

Anticipating a Public Need

The following interesting statement, complimenting the management of the Citizens Traction Company, Oil City, Pa., was contained in the *Democrat* of that city on Aug. 13:

"J. Harvey McClure, general manager of the Citizens' Traction Company, has introduced many changes in the operation of the cars of the company, with other conveniences for patrons, adding largely to the popularity of the service, with a corresponding increase in its patronage, since he assumed the duties of his important position. But there is probably none of these that will be more generally appreciated than that inaugurated yesterday when all of the big open cars running between Oil City and Franklin were furnished with a stool similar to those used by the Pullman Company on its sleepers.

"When the big cars were introduced into Oil City some years ago, each was equipped with a double step, running its full length on each side. The length of the car made it impossible to make the many sharp curves on Oil City's short streets in safety with the double-deck step, hence the lower one was removed. This left the distance from the street to the first step so great that an aged person, or one the least inclined to weight, could not negotiate it with any degree of comfort. Where the patron had passed middle age, getting on or off the car was also attended with considerable personal risk.

"As the cars were used only during the park season, the discomfort of boarding them or disembarking was submitted to without complaint. But Mr. McClure does not wait for complaints before conserving the comfort and safety of the men and women who travel on trolley cars. He gave the matter considerable thought, his inventive ability being stimulated by the new styles in gowns, which candor compels the admission were never designed to permit the wearer to take the high step the cars require. The Pullman stool seems to be the only solution of the problem. It is carried under the front or rear seat of the car and is easily placed when its use is necessary or demanded by a patron. That the device will be popular when it is more generally known that it is available is without question. It will tend to increase the patronage of these cars by ladies of modesty, besides eliminating the present name of the intersection of Sycamore and Center Streets known as 'rubber-neck corner.'"

Pussy-Footed Men Undesirable

At the annual meeting of the American Association of Railroad Superintendents in New York recently a communication was read from F. D. Underwood, president of the Erie Railroad, who was unable to be present. Mr. Underwood said in part:

"A retrospection shows me that I fell far short in all the essential qualifications I now attempt to portray. Even now I should like another chance on a red-hot division to prove I could be a better superintendent than I was.

"A superintendent should not do physical acts that can be done by someone else. The bawling, hauling we old-timers did is unwise from several points of view. A man who is never angry is not an efficient boss; the spur of anger should be concealed, used but to stimulate the stroke —never paraded.

"There are in all walks of life those who bluster, plead, lie and bring pressure from many sources. The processes used to carry their point are ingenious, plausible and persuading. Quietly sidetrack them when sure you are right; never willingly recede from a position that is fair.

"Breaking a rule or doing something outside of the rules is many times an offense to be condoned, provided the offender has brains. His action showed him fearless and perhaps expedient. There are the seeds of a good man in every rebel. Mentally pussy-footed sort of men are not desirable. An argufier—sometimes called a sea lawyer—has his uses.

"Never condemn a measure you want to kill; praise it, tell in how many times and places it would be fine, then put in the local misfit color."

Near-Side Stop in Leavenworth.—The Kansas City-Western Railway instituted the near-side stop in Leavenworth on Aug. 15.

Transfer Hearing in Missouri.—The Public Service Commission of Missouri will meet in Joplin on Sept. 19 to consider requests for broader transfer privileges from the Southwest Missouri Railroad.

Increase in Fare on New York Line.—The International Railway, Buffalo, N. Y., has filed with the Public Service Commission of the Second District of New York notice of a proposed increase in fare between North Tonawanda and La Salle from 10 cents to 15 cents, the increase to be effective on Sept. 15.

Decline in Traffic in Cincinnati.—Application has been made by the Cincinnati (Ohio) Traction Company to Mayor Spiegel and Service Director Fosdick for permission to reduce the service on all lines. The reason advanced is that many factories have laid off part of their forces and that the receipts of the company have declined about $500 a day. Mayor Spiegel has announced that he will take the matter under consideration, but that he will not consent to a reduction in service until an investigation now under way by the city has been completed.

Stopover Privilege Denied.—The Southwest Missouri Railroad, Joplin, Mo., having denied the request of the city that stopover privileges at the city market be granted, Charles A. Patterson, the city commissioner of public utilities and public property, ordered that cars stop at the market. The company refused stopovers because the tickets might be transferred by persons going to the market to others who are bound for destinations farther on the company's line.

Worcester Company Reduces Suburban Fare.—The Worcester (Mass.) Consolidated Street Railway is issuing special tickets which are to be used by passengers of the Worcester and Jefferson division of the company's lines. Under the new arrangement the tickets, used during certain hours of the day, entitle persons to ride between City Hall, Worcester, and the end of the line at Jefferson for 10 cents, or from Jefferson to City Hall. The fare has been 15 cents between Worcester and Jefferson. The tickets are good only between certain hours in the afternoon and in the evening.

New Through Illinois Traction System Service.—The Illinois Traction System, Peoria, Ill., has decided to run its local cars between Peoria and Decatur via Bloomington without change, the same as its limited cars. The running time between Peoria and Bloomington and Bloomington and Decatur will be shortened, and radical changes will be made in the leaving time of trains. An additional late train, which heretofore ran only to Mackinaw, will hereafter be operated through from Bloomington to Peoria. The company is now arranging to handle large crowds during the Illinois State Fair at Springfield and the National Implement and Vehicle Show at Peoria.

Changes in Fare Methods.—The Buffalo & Lake Erie Traction Company, Buffalo, N. Y., has announced that on Sept. 2 the regulation governing the collection of excess fare where fare is paid on cars will be changed to provide that no excess fare will be collected on fares of 10 cents or less; also establishing a new regulation to the effect that the point to point fares in the tariff do not apply to through transportation of passenger in cases where the through fare between the point of boarding and of leaving the car is more than 10 cents. In such cases the through fare will be charged and the regulations governing collection of excess fare will be applied.

Service Complaint in Hannibal.—The city attorney of Hannibal, Mo., has filed a complaint with the Public Service Commission of Missouri against the Hannibal Railway & Electric Company. The commission is asked to issue an order directing the company to provide better equipment; double track its lines on Broadway; provide sufficient cars to care for the traffic in the rush hours; sell tickets in lots at reduced rates, and make extensions which will insure transportation facilities to the northern part of the city. Extensions are asked to the Country Club and Riverside Park and the request is made that the company sell books of six tickets for 25 cents, and books of 100 tickets for $3.75.

Politics in Gary Fare Controversy.—On Aug. 18 the Common Council of Gary, Ind., issued a notice declaring the 3-cent-fare clause of the franchise of the Gary & Interurban Railroad to be in force. The franchise states that after the lines are in operation five years, tickets must be sold eight for a quarter. This clause the company will resist, it is stated, and an appeal will be made to the Public Utilities Commission. Alderman Dwight M. Kinder, Republican candidate for senator, is leading the attack on the company. State Senator Frank N. Gavit, Mr. Kinder's opponent and Progressive candidate for re-election, is president of the railroad. The company has been operating in the morning and evening rush hours for some time past at a 3-cent fare.

Traction Company Not to Transport Intoxicants.—At the last spring local option election in Decatur, Ill., the city went "dry" by a large majority, and the City Council passed an ordinance recently refusing any steam or electric or express company the right to bring any intoxicating liquor into the city. The chief of police called upon the agents of various companies and presented the order of the City Council in writing and demanded a receipt to the effect that the notice had been served. The representative of the Illinois Traction System, the Wabash, the Vandalia and the Cincinnati, Hamilton & Dayton Railroads, and the Adams, Wells-Fargo and America Express Companies complied with the order, but the agent of the Illinois Central declined to receipt for it.

Wreck on Chicago, Ottawa & Peoria Railroad.—A serious wreck occurred on Aug. 22 on the line of the Chicago, Ottawa & Peoria Railroad between Princeton and Joliet, Ill. The cause of the disaster was a broken brake rod on one of the limited interurban cars. The car was making usual schedule time on a straight stretch of track, and when the motorman attempted to stop his car as it approached a curve near Peru, Ill., a brake rod broke, causing the car to take the curve at such speed that it was overturned. After the motorman found his brake inoperative, he reversed his motor, which reduced the speed materially, and as a result the accident was not as serious as might have been expected. Fifteen passengers received injuries sufficient to require hospital attention. The car body, however, was but slightly damaged, it being one of this company's standard arched-roof interurban cars with composite underframe and a wooden superstructure.

Field Day of Beaver Valley Employees.—The third annual field day and picnic of the employees of the Beaver Valley Traction Company, New Brighton, Pa., was held on Aug. 7. For the twenty-nine events of the field meet 224 prizes, consisting of sweaters, clocks, thermos bottles, carving sets, hair brushes, manicure sets, razors, neckties, handkerchiefs, etc., were awarded. After the events on the program were run off supper was served. A number of persons besides employees of the company were invited and attended. They included physicians, members of Councils and other friends of the company throughout the Valley. The employees of the company do not solicit prizes from merchants, as do members of other relief associations throughout the section in which the company operates. Each individual contributes whatever he sees fit to the field day fund, the balance of the amount needed being made up by the company. This year the employees contributed three times the sum donated by the company.

Change in Signs in Louisville.—For many years certain of the Fourth Street cars of the Louisville (Ky.) Railway have continued out to Iroquois Park, which is 4 miles south of the city proper, though included in the city limits. Some of these cars take the Third Avenue route and some the Seventh Street route. These cars have lately been designated by large enameled signs carried on the front end, replacing small wooden signs and reinforcing the small signs in the windows over the motorman's head. Samuel Riddle, superintendent of the company, noted that considerable time was lost and confusion caused because would-be passengers often could not identify cars and had to stop them to inquire of the conductors whither they were bound. Frequently passengers got on the wrong cars. Now, however, the big red signs, appropriately lettered, indicate the cars which take the Third Avenue route and the big black signs the cars that take the Seventh Street route. Both cars run to populous suburban sections with a 5-cent fare, and carry large numbers of passengers to resorts at the edge of the park and to the park itself.

B. R. T. Holds Big Field Day.—An enthusiastically attended athletic field day was held on Aug. 27 by the employees of the Brooklyn Rapid Transit Company at Dexter Park, Brooklyn. Two baseball games were played during the day by teams representing depots of the company. These games form part of a regular series of about ninety games played during the summer by the Brooklyn Rapid Transit baseball league. During the afternoon much interest was shown in the field events and races, the most exciting of which was a relay race between thirteen teams for a loving cup. The events were not confined merely to the employees themselves but were extended to their wives and children, who participated in egg and potato races, while the gastronomic powers of their sons were taxed to the utmost by a pie-eating contest for boys. A collection of forty prizes, including gold-filled watches, rings, cameras, fountain pens and medals was distributed among the winners. Concerts given throughout the day by the regular Brooklyn Rapid Transit brass band added much to the attractiveness of the program. The athletic events were followed by a dance in the evening.

Through Interurban Service in California on 241-Mile Line.—A joint time-table has been agreed upon by the Oakland, Antioch & Eastern Railway, the Northern Electric Railway and the Sacramento & Woodland Railway whereby through service was established on Aug. 24 between Oakland and Chico, Cal. The distance between the cities is 241 miles, of which the Oakland, Antioch & Eastern Railway covers 107 miles and the two other roads the remainder. On one daily through train each way an observation car belonging to the Oakland, Antioch & Eastern Railway will be run, but on other trains than this passengers and freight will be transferred at junction points so that each line will operate only its own equipment. A total of 299 miles, including branch lines, is involved in the chain thus linked together. The cities north of Sacramento which are tapped are Woodland, Gridley, Colusa, Marysville, Oroville and Chico. The three-car trains operating from Oakland as far as Sacramento will have a total seating capacity of 146 and will make this 90.1-mile run on a regular schedule of two hours and fifty-seven minutes, or at an average speed, including stops, of about 30.5 m.p.h.

Personal Mention

Mr. H. G. Williams, assistant chief clerk of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has been advanced to the position of chief clerk of the company.

Mr. John I. Fiscus, inspector on the Sharon branch of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has been made assistant division superintendent of that branch.

Mr. J. B. Stewart, Jr., has been appointed superintendent of freight of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, in addition to safety and efficiency engineer.

Mr. Charles C. Beckman, who has been with the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, many years, has been appointed superintendent of ways and structures of the company.

Mr. M. C. McElligott, chief clerk to Mr. G. J. A. Paul, manager of railways for the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has been promoted to superintendent of transportation.

Mr. Thomas Flanigan, superintendent of the local division of the Mahoning & Shenango Railway & Light Company, at Sharon, Pa., has been promoted to division superintendent of the Youngstown & Sharon division.

Mr. Frederick L. Ray, superintendent of motive power of the Louisville (Ky.) Railway, is one of the incorporators of the Ray Manufacturing Company, which will manufacture and market a patented boiler feed regulator.

Mr. Bion J. Arnold and Mr. Walter Fisher, Chicago, who visited Europe this summer to study the terminal stations in large cities, are reported to have arrived safely in London. They are expected back in Chicago on Sept. 1.

Mr. James Compton, who has been master mechanic of the Atchison Railway, Light & Power Company, Atchison, Kan., has been appointed manager of the Omaha & Lincoln Railway & Light Company, Ralston, Neb. Both properties are controlled by the Illinois Traction System.

Mr. George B. Prest has been elected president and a director of the New London & East Lyme Street Railway, New London, Conn., to succeed the late Thomas Hamilton. The New London & East Lyme Street Railway is operated under lease by the Shore Line Electric Railway.

Mr. Alonzo L. Lockwood has been appointed division superintendent of the Niles branch of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio. He succeeds Arthur P. Newlin, who was killed in an accident on Aug. 14, when he fell under the wheels of a moving car.

Mr. George T. Bradley has been appointed a member of the new Colorado State Public Utilities Commission by Governor Ammons. Mr. Bradley was formerly chairman of the Democratic state central committee. He will serve on the new commission with Mr. A. P. Anderson and Mr. S. S. Kendall, formerly members of the Colorado Railroad Commission.

Mr. Howard S. Butler, who has been assisting Mr. LeRoy T. Harkness, assistant counsel of the Public Service Commission of the First District of New York, in the work of preparing and supervising rapid transit contracts, has been made an assistant counsel. Mr. Edward Riegelman has also been appointed an assistant counsel. Mr. Riegelman has been an assistant corporation counsel in charge of the street opening bureau for Brooklyn.

Mr. R. H. Sperling, retiring general manager of the British Columbia Electric Railway, Vancouver, B. C., was presented recently with a solid gold cigar box suitably engraved and bearing the Sperling family coat-of-arms as a token of esteem from his associates. Mrs. Sperling was the recipient of a diamond ring. The presentation was made by Mr. F. S. Barnard, resident director of the company. Subsequently a farewell banquet was tendered to Mr. Sperling at the Hotel Vancouver by the officials of the company, presided over by Mr. George Kidd, now general manager of the company. Representative officials from all over the company's extensive system were present.

Mr. F. N. Koziell, who was recently appointed chief engineer of the Railway Storage Battery Car Company, New York, began his railway experience with the West End Street Railway, Boston, Mass., after graduating from the Massachusetts Institute of Technology. Later on he was sent to Manaos, Brazil, by Flint, Eddy & Company as superintendent of motive power, line construction and track, and from there was transferred to the Rio de Janeiro (Brazil) tramways as superintendent of motive power. He returned to the United States in 1907 and became superintendent of equipment of the Union Railway, New York. Later he was appointed general manager of two electric lighting properties at Montpelier, Vt. When these properties were taken over by Tenney & Company, Mr. Koziell returned to the Pearson Engineering Corporation, Ltd., and was sent to Barcelona, Spain, as superintendent of motive power of the tramways in that city.

OBITUARY

Charles Alldis, for fifteen years superintendent of the Torrington division of the Connecticut Company, with offices at Burrville, Conn., is dead.

Isaac Newel Barton, railroad builder, died in his home at Flushing, Long Island, recently at the age of eighty years. He retired from active business fourteen years ago. Mr. Barton was the first superintendent of the Harlem Railroad. After serving seventeen years with that company he became general superintendent of the Long Island Railroad. He also was an assistant to Gen. George B. McClellan in the construction of the Atlantic & Great Western Railroad, and later was connected with the Brooklyn Union Elevated and Brooklyn Bridge Railroad.

Charles E. Bonney, formerly of Chicago, died on Aug. 16 at Jacksonville, Fla., where he had resided for the last ten years. Mr. Bonney was born in Peoria, Ill., on Jan. 23, 1858. He entered the traction field in Chicago by building the street railway in West Twenty-second Street. This work was begun in 1895. The company which operated the line was called the West & South Towns Street Railway, but the name was later changed to the Chicago General Railway. After the company was forced into the hands of a receiver in 1900 Mr. Bonney retired from business and removed to Florida.

Charles A. Ricks, secretary and assistant treasurer of the G. C. Kuhlman Car Company, died suddenly at his home in Cleveland on Aug. 24 as a result of heart trouble. Mr. Ricks was born in Massillon, Ohio, and was forty-five years old. He was the son of Judge Ricks, who sat on the bench of the United States Circuit Court when former President Taft was a circuit judge. His first business connection in Cleveland was with the Standard Oil Company. When the Kuhlman Car Company was reorganized about ten years ago he aided in this work and was made secretary and assistant treasurer at the time the property passed into the control of The J. G. Brill Company. Mr. Ricks was a member of the Country, Union and Tavern clubs. He is survived by a widow. The interment was at Massillon.

Mayor Marx Renominated in Detroit

Mayor Oscar B. Marx of Detroit, Mich., has been renominated on the Republican ticket by 10,000 majority over John McVicar. The latter's attack was largely on the ground that Mayor Marx, in perfecting the agreement with the Detroit United Railway in August, 1913, which provides for the sale of seven tickets for a quarter, had betrayed municipal ownership of street railways, to which he was pledged. The charge was denied by the Mayor. F. H. Ingram, the Democratic nominee, has indicated that the municipal ownership will be a leading feature in his campaign against Mr. Marx.

The work of appraising the properties of the Detroit United Railway within Detroit is progressing steadily under the direction of Prof. E. W. Bemis. Some question has been raised as to whether the appraisal would be completed within the time limit, fixed as Oct. 15, but the street railway commission has stated that the report will be forthcoming at this time.

Negotiations are proceeding between the representatives of the interested municipalities and representatives of the London & Lake Erie Railway & Transportation Company, London, Ont., looking to the extension of the company's line from St. Thomas to Aylmer, Ont.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

NEW INCORPORATIONS

***Southern Minnesota Traction Company, St. Paul, Minn.**—Incorporated in Minnesota with a capital stock of $250,000 to acquire and operate steam and electric railways. Incorporators: William D. Mitchell, George Hoke and Wilfred Rumble, all of St. Paul.

***Frederick & Brunswick Railway, Frederick, Md.**—Incorporated with a capital stock of $100,000 to construct an electric railway from Jefferson to Brunswick. It will connect with the main line of the Baltimore & Ohio Railroad at Brunswick and will be about 9 miles long. As soon as it is completed the line will be leased by the Hagerstown & Frederick Railroad. Among the promoters are T. H. Haller, E. L. Coblentz, T. B. Hayward and others identified with the Hagerstown & Frederick Railway.

FRANCHISES

Stockton, Cal.—The Stockton Electric Railroad has received a 50-year franchise to build double-track extensions in San Joaquin County.

Vallejo, Cal.—The Vallejo & Northern Railroad has asked the City Commissioners for an extension of time in which to complete its line in the northern section of Vallejo.

***Pocatello, Idaho.**—J. D. Browning has received a 30-year franchise for a street railway in Pocatello. The franchise provides for one track loop covering both sides of the town and specifies that additional mileage must be built for a period of three years.

Pekin, Ill.—The proposition for a municipally owned street railway and the authority to provide a bond issue to operate the same was carried at a special election held in Pekin on Aug. 21.

Peoria, Ill.—The Peoria Railway has filed a petition with the City Council for the double-tracking of its lines on Pennsylvania Avenue from Jackson Street to Indiana Avenue.

Cedar Rapids, Ia.—At a special election held in Cedar Rapids last week the people voted in favor of the ordinance giving the Waterloo, Cedar Falls & Northern Railway an entrance into Cedar Falls. The franchise gives the company perpetual rights to operate steam trains over some of the streets. The rights to operate electric cars over other streets are for a period of twenty-five years only. The ordinance now goes to the Council for adoption.

Hopkinsville, Ky.—A franchise providing for the construction of an electric railway in Hopkinsville was sold to R. E. Cooper on Aug. 22. [E. R. J., Aug. 15, '14.]

New Orleans, La.—The Thompson ordinance providing for the extension of the Claiborne Avenue line, rerouting of the Levee and Barracks line and the rearrangement of the Dauphin line was introduced in the Commission Council recently. These lines are operated by the New Orleans Railway & Light Company.

Patchogue, N. Y.—The Suffolk Traction Company has petitioned the Public Service Commission of the Second District for permission to build an extension of its line in Bayport and Sayville and for approval of the exercise of a franchise therefor.

North Tonawanda, N. Y.—The International Railway has applied to the Common Council for a new franchise in place of the one granted the Frontier Electric Railway for the construction of the proposed electric railway between Niagara Falls and Buffalo.

***Milwaukie, Ore.**—L. H. Campbell has received a 25-year franchise from the Council for a street railway in Milwaukie. It is stated that this franchise is not altogether for local purposes but that construction of an interurban line eastward from Milwaukie through the Mt. Hood country is contemplated.

Washington, Pa.—The Monongahela, Ellsworth & Washington Railway has received a 60-year franchise from the

Washington Borough Council over certain streets in the borough. The section of the line between Monongahela and Bentleyville is completed. [E. R. J., Aug. 8, '14.]

Dallas, Tex.—The Dallas Northwestern Traction Company has received from the Council six months' additional time in which to begin and complete the construction of 20 miles of track in Dallas. E. P. Turner, Dallas, president. [E. R. J., Aug. 15, '14.]

***Dallas, Tex.**—John T. Jones and associates have received a franchise from the City Commission for a street railway in East Dallas.

Waco, Tex.—The Southwestern Traction Company has filed an application with the County Commissioners of Waco for a right-of-way through incorporated towns south of Waco. [E. R. J., Aug. 1, '14.]

TRACK AND ROADWAY

Edmonton (Alta.) Interurban Railway.—This company will resume operation, with an hourly service, between Edmonton and St. Albert on Oct. 1. It is at present electrifying the line under the supervision of W. T. Woodroofe. It is understood also that negotiations are being carried on between the company and the Edmonton municipality whereby the latter will supply current for the operation of the line.

***Tramways, Ltd., Edmonton, Alta.**—This is a new company formed for the purpose of constructing a railway from Edmonton to Fort Saskatchewan, via Nanao, a distance of 18 miles. This company, together with the Edmonton Interurban Railway, is negotiating with the city with a view to securing running rights to some central point within the city limits. If a tentative agreement can be reached the ratepayers will probably be asked to vote on it.

Penticton, B. C.—In connection with plans for the operation of an electric railway between Oroville and Penticton, the Okanagan Valley Electric & Power Company recently acquired the Oroville electric light plant from the Similkameen Power Company, and will develop the power at Similkameen Falls to the fullest extent.

Fresno (Cal.) Interurban Railroad.—This company announces that it will begin building the second unit of its line between Alvina Heights and Clovis by Sept. 1. The contract for the work has been awarded to Mahoney Brothers. Material for the completion of the line has been ordered. About 2 miles of the line have been placed in operation. [E. R. J., Aug. 1, '14.]

Los Angeles (Cal.) Railway.—This company is extending the East First Street and Brooklyn Avenue line along North Gage Street to the site of its new carhouse. This line will be extended eventually to Eastlake Park.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—This company will spend $475,000 on its mole and wharf on the Oakland side of the bay. Contracts have been signed with the San Francisco Bridge Company for the work. The contract includes dredging, wharf building and mole construction. There will be an elaborate switching system. Track improvements amounting to $200,000 are being completed by this company in and around Oakland. About 50,000 ft. of new track and roadbed have been laid.

Visalia (Cal.) Electric Railroad.—This company will build a 2-mile extension of its line from Rose Station to Elderwood.

Shore Line Electric Railway, New Haven, Conn.—This company has received permission to extend its line from Backus Corner out along the Salem turnpike. The extension will be about one-third of a mile long.

Miami (Fla.) Traction Company.—This company has placed an order with C. C. Atkinson, of Little River, for 7000 ties to be used in the construction of its line. The ties will be laid in solid concrete and will carry 105-lb. girder rails through the business sections of the city and 90-lb. rails on the other streets. Surveys have been begun by this company in Miami. L. D. Llewellyn, Miami, engineer. [E. R. J., Aug. 1, '14.]

Covington & Oxford Street Railway, Covington, Ga.—Work will be begun within the next few weeks by this company on its line between Covington and Oxford. A loop will be built in Oxford.

East St. Louis & Suburban Railway, East St. Louis, Ill.—L. C. Haynes, vice-president of the East St. Louis & Suburban Railway, conferred recently with the president of the Belleville Commercial Club and a committee of East St. Louis business men and agreed to have the interurban cars, which are operated to the Belleville Square, run four blocks farther east on Main Street and to double track this stretch of four blocks.

Rock Falls & Southern Traction Company, Rock Falls, Ill.—Plans are being considered by this company to begin the construction of this line in the fall. The railway will connect Sterling, Ladd, Rock Falls, New Bedford, Tampico, Princeton, Setonville and Kewanee. Andrew S. Goodell, Rock Falls, secretary. [E. R. J., May 30, '14.]

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—It is stated that this company will build an extension this fall on West Tenth Street from Holmes Avenue to Tibbs Avenue.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—This company has nearly completed its right-of-way for the extension of the line between Bonner Springs and Lawrence, Kan. Construction on this section, about 21 miles, will begin about Sept. 30 and cars probably will be running in the spring of next year. The company began operation between Kansas City and Bonner Springs, 17 miles, on July 20. Four cars are used at present.

Skowhegan & Shawmut Electric Railway, Fairfield, Maine.—Surveys have been completed by this company for its 12-mile line between Skowhegan and Shawmut, but no plans have been made to begin construction. The greater part of this line will be through private right-of-way. It will connect at Shawmut with the Fairfield & Shawmut Railway, and with the Skowhegan & Madison Railway at Skowhegan.

Hagerstown & Frederick Railway, Frederick, Md.—An extension westward from Hagerstown to the Country Club is being contemplated by this company in the near future.

United Railways & Electric Company, Baltimore, Md.—The Public Service Commission has decided favorably upon the proposal of this company to divert the Emory Grove, Pikesville and Pimlico line into Madison Avenue at Whitelock Street and to make the route as follows: down Madison Avenue to Eutaw Street, to German Street, to South Street, returning over same course in Baltimore.

Salisbury (Md.) Interurban Railway.—Work will probably be begun in the fall by this company on the construction of its electric line to connect Salisbury, Hebron, Tyaskin, Bivalve and Nanticoke, a distance of 30 miles. [E. R. J., April 4, '14.]

Holyoke (Mass.) Street Railway.—This company will spend about $15,000 for the laying of new rails from the Willimansett Bridge through Holyoke.

Billings, Mont.—A. J. Showalter is said to have interested Butte capitalists in a proposition to construct an electric railway between Red Lodge, Bear Creek, Carbon and Stillwater. [E. R. J., May 23, '14.]

Charlotte (N. C.) Electric Railway.—This company is extending the Myers Park line from Queens College to Briar Creek, a distance of about 1 mile.

Jamestown (N. Y.) Street Railway.—Extensive double tracking operations have been begun by the Jamestown Street Railway in West Third Street, the most congested part of the city. It is intended to equip this section of the city with double tracks.

New York, N. Y.—The Public Service Commission has awarded the third contract for special work for the Fourth Avenue Subway. It covers the supply of switches and frogs for certain portions of that subway. The contract went to the lowest bidder, the Pennsylvania Steel Company, at $37,426, for final delivery within 100 days. Bids have recently been advertised by the commission to be opened on Sept. 15, for the construction of Section 2 of Route No. 48, the William Street portion of the Park Place, William and Clark Street Subway to be operated by the Interborough Rapid Transit Company. The plans call for a two-track underground railroad to be completed within 28 months from the deliv-

ery of the contract. The Public Service Commission of the First District has awarded to the Flinn-O'Rourke Company, Inc., the contract for the construction of Section 3 of Route No. 33, the Montague Street portion of the Whitehall-Montague Street tunnel line in Brooklyn. This contract is a continuation of the Whitehall-Montague Street tunnel line for operation by the New York Municipal Railway Corporation, and the same company has the contract for building the tunnel.

Toronto, Ont.—Municipalities will vote on Sept. 21 on the question of closing contracts with the Hydro-Electric Power Commission of Ontario to build an electric railway through the Newmarket, Port Perry and Uxbridge districts.

Oregon Electric Railway, Portland, Ore.—The Oregon Electric Railway has been formally invited by the people living between Eugene and Santa Clara to construct an interurban line down the River road, in case of the failure of the Portland, Eugene & Eastern Railroad to do so.

York, Pa.—George B. Wilson, Allan A. Herr and H. S. Williamson are securing right-of-way for an electric railway on the Harrisburg Pike to Long Park and the fair grounds adjoining the park. It is understood that the Conestoga Traction Company will assume the construction of the new line if a certain amount of stock is taken by persons interested in the new company.

Hull (Que.) Electric Company.—Improvements made to the lines of this company between Deschenes and Aylmer are expected to be completed shortly. About 2½ miles of track has been relaid and considerable ballasting has been done.

Nashville (Tenn.) Traction Company.—It is announced that operations of this company's line from the northern boundary of the city near St. Cecilia Academy to the corporation boundary on Lafayette Street will begin on Nov. 1. The company has adopted plans for the extension of the line to Una, but work will not be begun on this strip until the right-of-way recently granted by the County Court can be amended so as to give the line more territory along the road. It is thought probable that the company will obtain its current from the plant at Hale's Bar. [E. R. J., July 18, '14.]

Tacoma, Wash.—Bids will be received by Public Works Commissioner Woods until Sept. 8 for rails for the municipal street railway. A 5 per cent check must accompany the bid.

West Virginia Light & Traction Company, Charleston, W. Va.—This company is in the market for 5 miles of 70 to 80-lb. relaying rails, delivery to be made at Fayette, W. Va.

SHOPS AND BUILDINGS

Edmonton (Alta.) Interurban Railway.—It is stated that this company will erect a carhouse and repair shops at St. Albert.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—The general contract for the construction of the new carhouse of the Indianapolis Traction & Terminal Company at Highland Avenue and St. Clair Street has been let to W. P. Jungclaus. The F. S. Cannon Company is the architect.

Louisville (Ky.) Railway.—This company has completed the transfer of its equipment from the old shops at Eighteenth and Walnut Streets to the new shops on West Broadway. All the shop work is being done in the new quarters. The old buildings and site are to be offered for sale.

International Railway, Buffalo, N. Y.—This company has filed plans and specifications in Buffalo for the immediate construction of a brick addition to the Hertle Avenue carhouse to cost $20,000. Plans for a new station in Lockport as a terminal for the Buffalo, Lockport & Rochester Railway have been presented to the Aldermen of the city by the International Railway.

POWER HOUSES AND SUBSTATIONS

Pennsylvania Railroad, Philadelphia, Pa.—Braun & Stewart, Philadelphia, have received a contract from the Pennsylvania Railroad for the erection of substations at Bryn Mawr and Paoli in connection with the electrification of the main line to the latter point.

Manufactures and Supplies

ROLLING STOCK

Havana Central Railroad, Havana, Cuba, has ordered six electric cars from the Wason Manufacturing Company.

Buenos Aires (Argentina) Southern Tramways is contemplating the purchase of twenty new cars, inquiries on which have recently been issued.

Albany Southern Railroad, Rensselaer, N. Y., has ordered one express car from the Wason Manufacturing Company. This corrects an item in the ELECTRIC RAILWAY JOURNAL of Aug. 22, in which the name of the car-builder was mentioned incorrectly.

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex., has ordered two single-truck one-man cars from the Cincinnati Car Company, through W. R. Kerschner, its Eastern agent. The order was placed by A. M. Burke, consulting engineer American Properties Company, Wilmington, Del.

Laconia Car Company, Boston, Mass., is building a new type of car which is to be exhibited at the Atlantic City Convention. It is a low center-entrance car seating forty-four passengers. The car, completely equipped, weighs less than 500 lb. per seated passenger. It is a four-wheel car without trucks, but with novel connections to journal pedestals to prevent oscillation. This company is planning to show the car completely equipped with motors and air brakes. Westinghouse motors and HL control have been selected.

TRADE NOTES

Curtain Supply Company, Chicago, Ill., has received an order to equip with Forsyth fixtures and Rex rollers the 228 new cars recently ordered by the Chicago Surface Lines from The J. G. Brill Company.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received an order to equip with control, air brakes and automatic couplers the 100 new subway cars recently ordered by the New York Municipal Railway.

Art Metal Construction Company, Jamestown, N. Y., has appointed E. St. Elmo Lewis as vice-president and general manager, effective Sept. 1. Mr. Lewis has been for the past ten years advertising manager of the Burroughs Adding Machine Company.

Hess-Bright Manufacturing Company, Philadelphia, Pa., is planning to erect a new factory building at its present location on the main line of the Pennsylvania Railroad, Front Street, for the manufacture of its ball-bearings, and is also adding greatly to the machinery equipment in its present buildings.

William Wharton, Jr., & Company, Inc., Philadelphia, Pa., have appointed R. C. Hoffman & Company, Inc., as their representatives for the Southern Atlantic Coast, with main offices in the Continental Building, Baltimore, Md., and an Atlanta, Ga., office in charge of F. McDermott, located in the Candler Building.

Railway Storage Battery Car Company, New York, N. Y., has appointed Lee Klopman, for fifteen years treasurer of the Eugene Dietzgen Company, as general manager. F. N. Koziell, formerly connected with the Pearson Engineering Corporation, Ltd., has been made chief engineer of the Railway Storage Battery Car Company.

Electric Railway Improvement Company, Cleveland, Ohio, has recently leased bonding cars to the following electric railways: Des Moines (Ia.) City Railway, second car; Bell & Jamison, Los Angeles, Cal., second car; Jamestown, Westfield & Northwestern Railroad, Wilkes-Barre & Hazleton Railway, and Shore Line Electric Railway.

Willard Doud, formerly engineer of shop improvements for the Chicago, Burlington & Quincy and Illinois Central Railroads, has completed the engineering work involved in the design, construction and equipment of the new shops of the Belt Railway of Chicago, at Clearing, Ill., and announces the opening of offices at 538 South Dearborn Street, Chicago, for the handling of all matters pertaining to design, construction, equipment and operation of industrial and railroad shops, factories and power plants.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has elected J. J. Hanauer, a junior member

of the firm of Kuhn, Loeb & Company, as a director of the company to succeed Paul M. Warburg, recently confirmed as a member of the Federal Reserve Board. T. P. Gaylord, formerly district manager at Chicago, has been appointed acting vice-president to succeed H. D. Shute, who has been elected treasurer and assistant secretary of the company, succeeding T. W. Siemon, who resigned to become secretary and treasurer of the Union Switch & Signal Company.

ADVERTISING LITERATURE

Railway & Industrial Engineering Company, Pittsburgh, Pa., has issued a folder describing its Burke Horn Gap lightning arrester.

Dielectric Manufacturing Company, St. Louis, Mo., has issued a folder which contains colored samples of its various interior paint finishes.

Reading Chain-Block Company, Reading, Pa., has issued a catalog describing and illustrating its multiple-gear chain blocks, stationery hoists, jib cranes and steel plate, I-beam and geared trolleys.

Royal Enameling & Manufacturing Company, Chicago, Ill., has issued a catalog describing its porcelain enameled iron signs, which are for use in the electric railway field as guidance and danger signs and other purposes.

M. H. Treadwell Company, Inc., New York, N. Y., has issued a catalog describing the equipment for and containing views of installations of its industrial railways. Another catalog issued by this company describes its two-way dumping cars.

Barrett Manufacturing Company, New York, N. Y., has issued a folder entitled "Another Mile!" which contains a panoramic illustration of the vast plant of the Standard Steel Car Company's Works at Butler, Pa., which extend a mile in length and are equipped with 750,000 sq. ft. of specification roofing manufactured by this company.

Railway Accessories Company, Chicago, Ill., has issued a catalog describing the Wightman mechanically welded rail joint. As shown in the catalog this rail joint has been practically tested by a number of railroads, among which are the following electric railways: Seattle (Wash.) Electric Railway, Portland (Ore.) Railway, Light & Power Company, and Tacoma (Wash.) Railway & Power Company. Testimonial letters from these companies are quoted in the catalog.

Prepayment Car Sales Company, New York, N. Y., has issued a strikingly colored folder entitled "Origin and Development of Prepaying on Street Cars." The prepayment idea (on street cars) is declared to have been originated by Messrs. Ross and MacDonald and was later developed by the Prepayment Car Sales Company. The prepayment idea was developed on the theory that a small minority of the public are willing to appropriate anything to themselves without pay. The folder calls attention to the fact that though a "free ride" does not seem to be a very heinous crime to the perpetrator, yet enough free rides would wreck the richest railway in the world. The value of the prepayment car is shown in that it prevents accidents and continual accident claims and also checks the free rider.

C-A-Wood-Preserver Company, St. Louis, Mo., has issued a folder entitled "The Third Degree," which contains a declaration that the manufacturers will furnish to every purchaser a sworn analysis of their wood preserver, together with a blank affidavit to be executed by the seller offering his product in competition. This company has also issued a sheet containing information relative to comparative tests of its wood preserver and other similar preparations. A chart attached to the sheet which was prepared by the U. S. Forest Products Laboratory shows that in a test made a cubic foot of wood absorbed 13.45 lb. of coal-tar creosote and 15.1 lb. of wood preserver, and that in a twelve weeks' open test the wood treated with creosote lost 22.42 per cent in weight, while wood treated with the wood preserver of this company lost only three-tenths of 1 per cent.

Trolley Supply Company, Canton, Ohio, has issued a folder describing its roller-bearing trolley base, which is designed to prevent trolley wheels from jumping. The higher the pole goes up the more tension there is against the wire, and the tension decreases as the pole goes down. The lowest tension occurs when the pole is hooked to the roof of the car. This arrangement makes it easy for the conductor to pull the trolley pole down when desired. Another catalog has recently been issued by this company describing and illustrating its trolley supplies, including Knutson trolley retrievers Nos. 2 and 5 for high-speed roads, "Ideal" trolley catcher, simplex roller-bearing trolley base, Peerless roller-bearing trolley base No. 10, Peerless check valve and Junior headlight, pressed-steel headlight, Hollis safety fender, and detachable fender. In the Knutson No. 5 trolley retriever, the same retrieving mechanism is used as in the No. 2, but the opening of the case is enlarged and the method of connecting the rope to reel by means of a chain, screw eye, ferrule and rivet is eliminated. A knot is tied in the end of the rope, which is inserted in a slot in the reel. By inserting the knot it releases the knot pawl and throws the weak spring in action. Should the rope break while the retriever is in action, it would not be necessary to remove it from the car to replace the rope, as the operator himself can do this in a few minutes simply by tying a knot in the rope and inserting it in the reel.

NEW PUBLICATIONS

Traffic Glossary. By R. E. Riley. La Salle Extension University, Chicago, Ill. Paper bound, 136 pages, $1, postpaid.

In the study of interstate commerce and general railway traffic many terms of a technical nature are used for which in the past it has been difficult to obtain convenient, reliable and clear definitions. This traffic glossary prepared for La Salle Extension University should be of material aid in supplying this need. The book is divided into four sections covering the following points: Definitions of traffic territories, definitions of traffic terms and provisions, application of classifications and suggestive questions. Such problems as the meaning of western termini, S.U.L.C.L. (set up in less than car-loads) or reciprocal demurrage can easily be solved by reference to the glossary. It is realized, of course, that territorial definitions are supplemented and superseded from time to time, and where the actual movement of traffic is involved the glossary must naturally give way to the latest official publications on the subject. For general information concerning technical traffic terms and interpretation of abbreviations, however, the glossary serves as a convenient reference book.

Business Administration. By Edward D. Jones. The Engineering Magazine Company, New York, N. Y. 5 in. x 7½ in. Bound in cloth, 275 pages, $2.

In the belief that the administration of manufacturing and operating companies under modern conditions is developing into a new profession, the author of this book has sought its scientific principles by a study of the older professions with which it is most closely allied. His argument is briefly that success in dealing with men and affairs depends upon certain basic laws which can be discovered by studying the work of successful administrators, that the rules and methods followed by masters of business and finance are usually deliberately hidden with no records throwing full light on their lives and acts, but that leaders in stage craft, war and science are figures of world-wide interest, whose career and practice are fully illumined by public and private records, correspondence and personal reminiscences. From such data as these Professor Jones has analyzed different primary principles of administration. In history and the biographies of military conquerors, diplomats and scientists he finds the elementary rules of success.

It has sometimes been stated that the study of scientific management may direct itself to machines, materials, methods and men. Heretofore the first force of scientific management investigation has been expended along the lines of the first three items. It is being realized more and more at present, however, that the human factor is the one of superlatively high rank. For this reason the present book is very interesting, for it examines the best thought of the world to find out how great statesmen and generals have worked with the human beings under their control. The plea of the author in general is for the conduct of modern industrial life in harmony with modern thinking, and it must be said that his treatment of the subject tends to raise administration to a higher plane among the profession than heretofore.

BRILL GRADUATED SPRING SYSTEM

"THIS spring seat fits over the band of the semi-elliptic spring of the Brill 39-E Single-Motor Truck and the 76-E Double-Motor Pivotal Truck. The coil spring, which it supports, is made to allow 3-8-in. clearance between the spring seat and the spring cap formed in the end of the bolster. The soft-acting coil springs give a singularly smooth motion to the car with a light load and when the car has between half and a full load of seated passengers the bolster and spring seats come together and the slower-acting semi-elliptics come into play. As cars run "light" most of the time, the advantage of graduating the spring system for light and heavy loads is highly important, not only for passengers' comfort but for the maintenance of cars, trucks and track."

THE J. G. BRILL COMPANY
Philadelphia, Pa.
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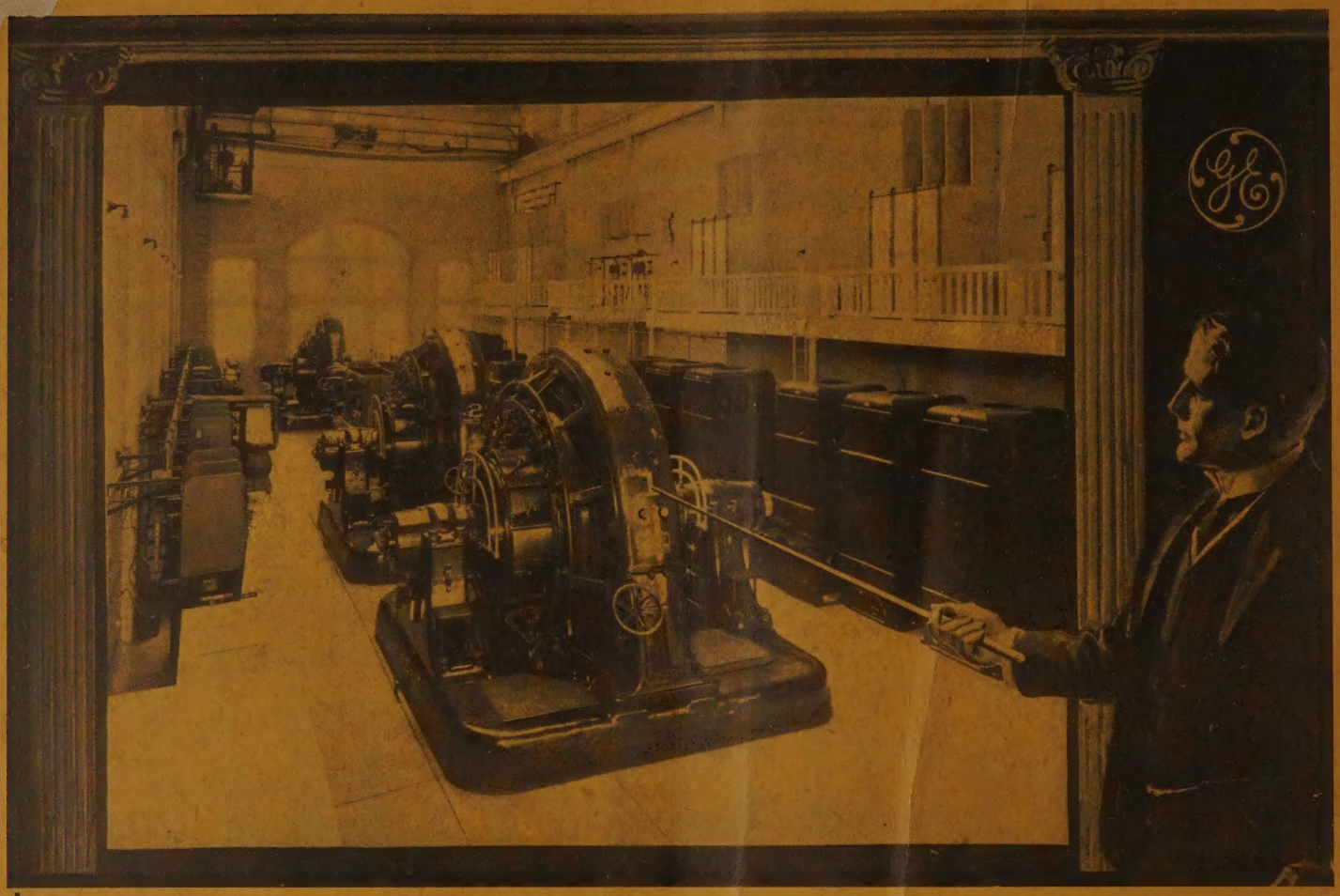

G-E Rotaries Meet Heavy Service Conditions on the New York Central

The Irvington Substation shown in the above view is particularly interesting to Railway men because it exemplifies the value of the commutating pole machine. Four times every hour this station is expected to haul a 1000-ton passenger train through the section.

The average load is about 20% of the peak, and yet the station operates with remarkable economy because of the fact that the rated capacity in operation is only one-third of the peak load—the commutation pole feature taking care of 200% momentary overloads.

Machines that will pick up a heavy train without warning, and still give good economy 24 hours a day, are the kind of machines you need for your road—It is the kind of insurance that reduces first cost, does not increase operating costs, and yet protects you against commutation failures when your big peak loads come along.

General Electric Company

Largest Electrical Manufacturer in the World

General Office: Schenectady, N. Y.

List of offices on page facing first Reading

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